RAILROAD GAZETTE

FRIDAY, JANUARY 23.

The Late John B. Jervis.

[Written for the *Railroad Gazette* by WM. P. SHINN, M. Am. Soc. C. E.]

In the death of John Bloomfield Jervis, at Rome, N. Y., on the night of Jan. 12, the country lost another of those remarkable men bequeathed to this generation by the latter part of the 18th century, whose talents and energies have for seventy years been directed toward building up the wonderful system of internal improvements which marks the history of the nation during the present century.

Mr. Jervis was born at Huntington, Long Island, Dec. 14, 1795, and was consequently in his 90th year at the time of his death. His father was Timothy Jervis, a carpenter by trade, and a resident of Huntington. His mother was Phœbe Bloomfield, of Woodbridge, N. J. The brother of Mrs. Jervis, John W. Bloomfield, went to Fort Stanwix, now Rome, N. Y., from New Jersey, to act as agent for and to look after a large tract of land in that vicinity, which resulted in the purchase for himself and two or three others of the "six-thousand-acre tract." He soon after settled in what is now the town of Aunsville, which was named after his wife. About 1812 he removed to Rome, purchased a farm, which included the homestead of Mr. Jervis, and lived and died in a house which then occupied the site of Mr. Jervis' late residence. His death occurred in 1849, at the age of 84. He was widely known, and universally honored and esteemed.

In 1798 Timothy Jervis moved to Fort Stanwix, which was chiefly prominent as having a navigable canal of about two miles in length, connecting the Mohawk River with Wood Creek. By connecting improvements in the form of locks and dams on the Mohawk River and Wood Creek, it formed part of a system of improvements to connect the natural navigation through a large portion of the state of New York. By these means barges or bateaus passed from Schenectady, on the Mohawk, to Ithaca, at the head of Cayuga Lake. The country was at this time mostly a wilderness of heavy timber, and Timothy Jervis soon became interested in a saw-mill, which was attended by himself and his sons. John B. Jervis was the oldest of seven children and had the experience of the trials of a settlement in a new country. What education he had was obtained at the common schools of that day, which he attended until he was 15 years of age. There were then no public schools sustained in whole or in part by the state. Between the ages of 15 and 22 he spent his summers in managing a team and attending the saw-mill, with occasional farm work, and during the winters he was engaged in hauling saw-logs and wood.

In 1817 the construction of the Erie Canal was commenced, and the work afforded employment and furnished facilities to a large class who had theretofore followed other pursuits. Benjamin Wright, more generally known as "Judge" Wright, was Chief Engineer in the construction. Judge Wright resided in Rome, and therefore knew Mr. Timothy Jervis and his sons. Needing an axeman, he applied to Mr. Jervis, who suggested that he should take John, which was the beginning of what afterward became the remarkable engineering career of John B. Jervis, who then turned his attention to the study and practice of surveying and engineering. Dextrous with an axe, apt and ambitious to learn, ready to do all and more than was required, he was soon promoted to the position of rodman in the survey at $12 per month, in which he reached such proficiency that in two years he was made Resident Engineer on 17 miles of the canal, extending from Canastota, Madison Co., to Limestone Creek, in Onondaga Co., at a compensation of $1.25 per day. Mr. Jervis was then about 25 years of age, and although the young engineers of to-day might smile at an offer of $1.25 per day, that position and salary, 65 years ago, were considered very desirable and lucrative.

Mr. Jervis records, in some notes which he has left for the purpose of a memoir, that after filling a winter engagement for weighing stone for locks, he started for Rome, a distance of 40 miles, on foot, traveling four miles on the evening of the first day, to a village where he and his associates spent the first night, and thence started at daylight to walk 36 miles to Rome, over melting snow, which made the traveling very heavy and disagreeable, reaching Rome about 9 o'clock in the evening, pretty well fatigued, but hardly the worse for it the next day. During this period Mr. Jervis was under the direction of Judge Bates as chief of the party, and Canvass White, well known among New York engineers, as the principal assistant.

In the spring of 1820 he became well acquainted with Henry Seymour (father of Hon. Horatio Seymour), who was one of the Canal Commissioners, and with whom Mr. Jervis had had frequent intercourse in relation to his duties. In the spring of 1821 Mr. Jervis was assigned the position of Resident Engineer to the division extending from "The Nose" to opposite the village of Amsterdam, about 17 miles; Mr. Seymour being the Commissioner of that division. He retained the charge of this division until the close of 1822, when it was mostly completed, and the party was disbanded, except himself. He was retained to aid in the settlement of the accounts of the contractors, which occupied his time for the balance of the year. This work was discharged with such acceptability that he was retained by Commissioner Seymour, in the opening of the season of 1823, to take charge of such work as still remained to be done on the canal between the Minden Dam and the Upper Mohawk aqueduct, a section of 50 miles. It was then made his duty to organize parties of men to superintend the work of repairs and such incidental improvements as were found necessary to bring the section into use for navigation.

The custom was at that day to stop small leaks in the canal by dumping in clay, but Mr. Jervis records that "finding the clay not satisfactory in the leaks that occurred, I made trial of fine gravel intermixed with sharp sand, which, while it did not fully stop the leak at the first application, was not sensibly carried away, and the interstices being small they were gradually filled up, and the work became tight," which marked a decided advance in the mode of repairing leaks, and was illustrative of the care with which Mr. Jervis always investigated details. In the spring of 1825 the canal was opened to Albany, and Mr. Jervis was continued as the Superintendent Engineer on the same division. During that year and until March, 1825, he had full charge of the entire section from Amsterdam to Albany, and all accounts for labor and material passed through his hands. He records the fact that the actual cost of operating the section of 50 miles for one year, including lock tenders and all expenses except those for the collection of tolls, was at the rate of $600 per mile.

Mr. Canvass White, the Principal Assistant Engineer, left the state service for other work in 1823, and as Judge Wright, the Chief Engineer, had many calls for his services on canal enterprises in other states, the entire responsibility for the section referred to was thrown upon Mr. Jervis and Mr. Seymour, the Canal Commissioner.

After seven years' employment on the Erie Canal, Mr. Jervis closed his services by resignation early in the month of March, 1825, very much to the regret of Mr. Henry Seymour, who gave him warm testimonials. Mr. Jervis went to New York and had an interview with Judge Wright, who had entered into an engagement with the Delaware & Hudson Canal Co., which resulted in the engagement of Mr. Jervis as Chief Engineer of that company, with Judge Wright as Consulting Engineer. Preliminary surveys and estimates had been made for the construction of a water route, partly canal and partly slack-water; but Mr. Jervis, after a careful investigation, decided against most of the slack-water plan, his decision being approved by Judge Wright. Near the close of 1827, Judge Wright resigned, and Mr. Jervis was appointed to succeed him, and remained in charge of the work until 1830. During this time he constructed the inclines of the Carbondale Railroad and ordered from England the "Stourbridge Lion," the first locomotive imported into this country, which, with two others, were ordered about a year before the famous trial on the Liverpool & Manchester Railway, indicating Mr. Jervis' extraordinary foresight and courage. This locomotive, Mr. Jervis states, was bought under an order from him for a locomotive which should not exceed 5½ tons in weight. The "Stourbridge Lion actually weighed 7 tons exclusive of coal and water, with the proper complement of which its weight was 8 tons, and consequently in excess of the weight which the trestles of the Carbondale road were built to sustain, and hence the locomotive could not be used. But the criticism that the trestles were too weak for their intended purpose is negatived by the fact that they bore in the first 20 years the transit of about 5,000,000 tons of coal. Mr. Jervis is certainly entitled to the credit of having introduced the first locomotive on the American continent, and its failure to be serviceable was not due to any error of his.

In 1830 Mr. Jervis was appointed Chief Engineer of the Albany & Schenectady Railroad, the first railroad constructed in the state of New York. The works of the Delaware & Hudson Canal and Railroad were completed in the fall of 1829, and a few boats loaded with coal were transported to tide-water on the Hudson. Mr. Jervis records that at this time he employed Mr. John H. McAlpine to superintend the construction of machinery, who introduced his son, Wm. J. McAlpine, then about 16 years of age, and requested a place for him. Mr. McAlpine's widely-known engineering reputation started with that introduction.

Mr. Jervis subsequently became Chief Engineer of the Schenectady & Saratoga Railroad, and while occupying this position, in 1830, his attention was drawn to the inadequacy of the locomotives of the then existing plan for high speed. This was especially noticeable in the action of the second engine imported for the Albany & Schenectady Railroad, called the "John Bull," the first having been named the "De Witt Clinton." Mr. Jervis says of the "John Bull:" "It being placed on four wheels, the overhanging caused a sharp and disagreeable motion of the engine. This circumstance, with others, induced me to continue my researches for a remedy for the weight, and to secure a more steady motion for the engine, and I was finally led to the plan of a four-wheeled truck under the forward portion of the engine as a support for that end." Mr. Jervis records that his mind was made up in regard to the form of this truck in the summer of 1830, although he had no opportunity to construct an engine of that plan until 1832, when the first engine having one pair of drivers and a four-wheeled truck, manufactured by the West Point Foundry Association, was run on the Mohawk & Hudson Railroad, by David Mathews, till a speed of 50 miles per hour was attained. An engraving in the *Railroad Gazette* for Feb. 3, 1872, shows the engine so designed in 1831. It is scarcely necessary to add that this precise form of truck is now in use on over 125,000 miles of railway in this country, as well as on many thousand miles in other countries. After the completion of the two railroads above mentioned, in 1833, Mr. Jervis was engaged by the Canal Commissioners as Chief Engineer of the Chenango Canal, 98 miles long, with 100 locks. On this canal, for the first time in this country, resort was had to artificial reservoirs for the supply of its summit level with water, and Mr. Jervis was the originator of the method. In 1835, the work of the enlargement of the Erie Canal was attempted, and Mr. Jervis was called upon to make surveys and estimates on the eastern section. He proposed corrections for many errors in its original construction, and at Little Falls he wholly rearranged the locks.

In October, 1836, he accepted the unsolicited offer of the position of Chief Engineer of the Croton Aqueduct, considered at the time of its completion as the greatest example in the world of hydraulic engineering skill. The difficulties with which Mr. Jervis had to contend, caused by the ignorance and sometimes by the malicious criticism of the opponents of the aqueduct, greatly tried his patience and skill, but he succeeded in holding the position until the work was completed; and it deserves to be here recorded as an example for engineers and for the constructors of public works to this day, that the reservoir constructed to supply the then population of 250,000, with a view to ultimately supplying a population of 500,000, starting with the delivery of 12,000,000 gallons per 24 hours, is now supplying 95,000,000 gallons daily to a population of 1,400,000, and that the cost of the whole work, exclusive of the High Bridge, estimated by Mr. Jervis on Jan. 2, 1838, at $8,464,033, was completed by a total expenditure to Jan. 31, 1848, of $8,766,626, an excess of cost over original estimate of but $302,592, or about 3.7 per cent., which excess is almost entirely accounted for by the loss of the partially completed Croton Dam on Jan. 8, 1841, and by the increased cost of land damages; outside of which items, we have the personal authority of Mr. Jervis for stating that the excess in cost over the original estimate was less than one per cent.

Mr. Jervis was appointed in 1846 Consulting Engineer on the Boston water supply, which position he held until 1848, during which time the Cochituate Water-Works were located and partially constructed. The water-works at Port Jervis, which place was named after Mr. Jervis by the directors of the Delaware & Hudson Canal Co., were constructed under his supervision, as were also the Rome water-works, in 1868. In 1847 Mr. Jervis was made Chief Engineer of the Hudson River Railroad, which position he held until 1849, and was Consulting Engineer until 1850. During his incumbency the Hudson River Railroad was completed from New York to Poughkeepsie, which included all the difficult portions of the work. The obtaining of capital for its construction was greatly facilitated by Mr. Jervis' well-known caution in recommending any scheme.

In 1850 Mr. Jervis went to Europe, where he spent four months, and was received with great honor on account of his engineering achievements. While there he was invited by Robert Stephenson to witness the launching of one of the large tubes for the bridge over the Menai Straits, of which he says: "The spectacle was highly interesting in itself, and was followed by an invitation to dine with a party of

English engineers, an occasion I enjoyed very much." On his return he engaged as Chief Engineer in the construction of the Michigan Southern & Northern Indiana Railroad, now the western portion of the Lake Shore & Michigan Southern, and then one of the most prominent public works of the country, about 66 miles of which, originally known as the Erie & Kalamazoo Railroad, had been constructed by the state of Michigan with a wooden rail and iron plates. Mr. Jervis continued his connection with this company until the spring of 1858. During the summer of 1851 he was made President of the Chicago & Rock Island Railway, which was constructed from Chicago to Davenport, 180 miles, and brought into use about 1854. From the spring of 1858 until the spring of 1861 Mr. Jervis was without professional engagement. In the fall of 1861 he was appointed General Superintendent of the Pittsburgh, Fort Wayne & Chicago Railway, then just emerging from a condition of practical bankruptcy. The bondholders had foreclosed and sold the road and the company had been reorganized, acknowledging, however, all classes of stockholders and creditors to the full amount of their original interest. The road had been cheaply constructed and inadequately maintained, and was in poor condition. The stock was then selling at 8 per cent., and not long after Mr. Jervis entered on the management a stockholder inquired of him if it would be advisable to sell at 20 per cent. He held the position of General Superintendent until March, 1864, when he resigned to take that of Chief Engineer, which position he occupied until 1866, and was Consulting Engineer of the company until 1872. During the period of his superintendence the track and machinery were greatly improved, the latter being very much increased in quantity, as well as improved in quality. During his administration all the fixed liabilities of the company were promptly met, and soon after his resignation as General Superintendent the company paid a semi-annual dividend of 5 per cent. The foundation was laid by Mr. Jervis for the extraordinary success with which the company's affairs have been so ably managed by his successors.

About 1872 Mr. Jervis was consulted by the parties who were contemplating the building of the Cazenovia & Canastota Railroad, who submitted to him an estimate which they had procured of the cost of building the proposed line, asking his opinion thereof. With his usual caution and foresight, he recommended that they double the amount of the estimate, and not undertake the construction until they were prepared to expend the increased amount. This somewhat delayed the construction of the road, the cost of which, when completed, fully sustained Mr. Jervis' views. In 1868 he was made one of the first trustees in the organization of the Rome Merchant Iron Mill Co., which position he occupied until the time of his death. The operations of the company for the first two years resulted in serious loss and threatened its bankruptcy, but in 1872 Mr. Jervis came to its rescue with a large loan of his personal funds, and assumed the position of Secretary, which he held at the time of his death. Under his wise and prudent administration—for his was the keynote in the management—the company retrieved its former errors, and is now on a prosperous footing.

It will be seen, therefore, that for more than 70 years Mr. Jervis has been an active worker, and all his work has been of a character to leave an enduring impression on the country. Since his practical retirement from active railroad management in 1866, he found time to write a book on "Railway Property," and another on "The Question of Labor and Capital." In 1877 he wrote a paper, published in the *International Review*, advocating the use of locomotives for towing boats on the Erie Canal—an unexampled evidence of progress at the age of 82. In 1879, at the request of the Young Men's Christian Association of Rome, Mr. Jervis wrote a lecture on "Industrial Economy," which was delivered before that Association. He was then past 83 years of age, yet that lecture showed his mind to be as clear, strong and vigorous as in the days of his prime. In 1878 Hamilton College conferred on him the degree of LL.D.

His last professional work, and that which most fully illustrates the extraordinary character of his professional ability, and the esteem in which he was held by his engineering contemporaries, was his employment as a Consulting Engineer on the proposed new Croton Aqueduct, by the late Isaac Newton, Chief Engineer, and by Mr. E. S. Chesbrough, then Consulting Engineer of that work. Upon this business Mr. Jervis came to this city in December, 1881, and remained here some two weeks, consulting daily with Messrs. Newton and Chesbrough, and on his return to Rome he took with him various plans, and made a report substantially indorsing the plans proposed by Messrs. Newton and Chesbrough. That he should be equal to this work at the age of 86 was sufficiently remarkable, but that he should be considered as worthy of being consulted by men themselves veterans in the profession, is a still more extraordinary evidence of the exceptional character of the man.

Mr. Jervis' strongest trait was his absolute conscientiousness, exemplified in every walk of life. His career was an example of the most sterling integrity, and while he had many critics and opponents during his professional career, the tongue of slander never wagged against him. His life was a grand example to the young in all professions, and particularly to those of his own profession, who meet with so many temptations and discouragements; and a study of his memoirs, which will be published at length at an early day, will enable many a man to avoid the rocks upon which so many barks are foundered.

Mr. Jervis was an Honorary Member of the American Society of Civil Engineers, to which he was elected Dec. 2, 1868, being the second honorary member elected. At the time of his death he was the oldest member of the Society.

Mr. Jervis was twice married. In 1834 he married the daughter of the late George Brayton, of Weston, who died in 1889. Two years later he was married to Eliza R. Coates, who survives him. His health for the greater part of his life was remarkably good. During the past year his strength had been gradually failing, and he told the writer at his last interview in November that his work was done. He had no special disease; the machine had simply worn out from old age. When the writer talked with him, only two months ago, his mind was as clear and his faculties as undimmed as at the beginning of our acquaintance, 24 years since, and it was only for a day or so before his death that mind and memory failed him.

In the death of John Bloomfield Jervis the whole community may truly mourn; for a great engineer, a good man and a valuable citizen has departed. The important and enduring works on which he had spent a lifetime will elevate and benefit the human race long after his remains shall have crumbled to dust, and his fame as one of the greatest of American engineers will survive the age in which he lived. But, above all, the remembrance of the industry, energy and perseverance by which he overcame all obstacles, and raised himself from the lowest to the highest rank in his profession, his purity of life and his honorable and high-minded character, will survive as an example and an incentive to the young men of America and encourage them to emulate his virtues.

Contributions.

From the Northernmost Railroad of the World.

LULEA, Sweden, Oct. 15, 1884.

TO THE EDITOR OF THE RAILROAD GAZETTE.

I have charge of the locomotives on the North of Europe Railroad here, a new line in 65° 30′ latitude, or some 1,260 miles further north than any line in Canada and some 300 miles nearer the North Pole than any line in Russia. The winter has just set in here and it has come a week too soon, as my round-house (a sort of log cabin made of ties) will not be completed for a week or so. I have to keep a fire in there to keep the boilers and tanks from freezing. I should be very much obliged if you would inform me of the American practice in keeping displacement cylinder lubricators, etc., from cracking from the freezing of the condensed water. I should also be glad of any other hints with reference to working in severe weather. I saw an illustration in the *Railroad Gazette* for Sept. 12 of a new machine for clearing the track of snow. It was an arrangement for cutting the snow and then throwing it into shovels and throwing it clear. If you would kindly let me know how this has answered I should be glad, as we shall in all probability be wanting something of the sort here next winter, as it is anticipated that we shall have 100 miles open for traffic next November. Your paper is an exceedingly good one, and I can safely say that it is really the only railway paper I have seen, as we have nothing in England to equal it. I have not been successful in getting my engines photographed, as all the photographers here are women and they think a 1½-mile walk too much for them. CHAS. T. BROXUP.

[If the displacement lubricator is placed inside the cab and the pipes leading to the cylinders kept inside the lagging and close to the boiler shell, you will probably have no trouble from frost.—EDITOR RAILROAD GAZETTE.]

Railroad Terminal Facilities at New York.

I.

NEW YORK, September, 1884.

It is evident that the work of moving freight on railroads consists in general of the operations of transporting or hauling, which may be classed as "work on the road and at division yards," and also of the operations of handling or receiving and delivering, which may be classed as "work at stations and station yards." And it is equally evident that these two classes of work, are distinct both in methods of operation and management, for while the railroad companies have full control of all details of hauling, the work of handling directly depends also upon the merchants, and their commercial laws and business methods.

This division is not always clearly defined, either in railroad work or accounts, but it is proposed herewith to make a distinct separation and to give some notes on the terminal work alone of some of the railroads entering the port of New York. It is not intended to give complete details, but simply to give an idea of the general methods; of the appliances used and the work done. Very little description will be given of the clerical work, and none at all of the management.

The freight handled by these railroad companies has been divided into three general commercial classes:

Goods for local use and local storage; the terminal movement of this class is east-bound, and is from the cars to the stores, markets and warehouses and factories, which last are generally situated inland in New York, and on the water in Brooklyn and other points.

Goods sold in New York for shipment to the interior: the terminal movement of this class is west-bound, and is from the warehouses and factories to the cars.

Goods for direct export or import to other markets: the terminal movement of this class is both east-bound and west-bound, and is between the vessels or bonded warehouses and the cars.

This terminal movement in general is not always either direct or prompt, even where the railroad tracks run to the warehouses and shipping docks. The goods in general, whilst in the hands of the railroad company, are subject to the important operations of weighing and inspection by the merchants, the commercial exchanges, and the railroad companies themselves, and in addition to this the final destination of the east-bound freight is often uncertain. Hence the railroad companies are frequently obliged to furnish room for temporary storage in their freight houses, and it will therefore be well before giving any details of operation to divide the freight handled at stations and yards into the following terminal classes:

Class I.—Goods promptly handled in large lots and weighed, either in the car by the railroads or in piece by the shippers, such as machinery, lumber, coal, hay, potatoes, cheese, etc. The handling of this freight is a mere transfer to and from the cars, often performed by the merchants, and on account of the simplicity of this operation requires but a small expenditure of room and labor. It is more open to the application of mechanical contrivances, and it is the constant effort of all railroad companies to enlarge the limits of this class of operations.

Class II—Goods promptly handled, but requiring weighing by the piece and sorting for destination by the railroad companies, such as dry goods, groceries and other out-bound freight. The handling of this freight requires more room and labor than the first class, and any system of work or of communication between the railroads and the shippers by which the labor on this class of operations can be diminished is worthy of consideration.

Class III.—Goods not promptly handled and requiring temporary storage on account of inspection or uncertain destination, such as grain, flour and other in-bound freight. The handling of this freight requires much more room and labor than any other, and machinery is applied to it as far as possible.

It is possible that the following description may suggest standard arrangements of both freight house and yards, and also help to fix the approximate area necessary for the daily movement of a given number of cars at country, city and seaport stations.

The hauling in the city is not done by the merchants except in a few cases, and never by the railroad companies, but by third parties, who own the drays and horses and contract for the work at a fixed price per piece or per ton, according to the freight. The drays hold from 3 to 4 tons of heavy freight for each 2-horse team.

NOTES ON THE TERMINAL WORKS AND BUSINESS OF THE NEW YORK CENTRAL & HUDSON RIVER RAILROAD AT NEW YORK.

The general business of this road extends over connecting lines to all parts of the Western states and Canada, and the railroad proper with its branches traverses for a long distance a portion of New York state, both rich in its population and varied in its products.

The Western freight business, known as the "Line Freight," is managed by the following companies and organized agencies, each using special cars, viz.: Merchants' Dispatch Transportation Company, doing certain business over all connecting lines; the Blue Line on the Michigan Central Railroad; the Canada Southern Line over the Michigan Central Railroad exclusively; the Red Line over the Lake Shore and Wabash Railroads; the Nickel Plate Line over the New York, Chicago & St. Louis Railway; the White Line over the Cleveland, Columbus, Cincinnati & Indianapolis Railway; the Midland Line over the Lake Shore and other railroads. These lines are co-operative associations of railroad companies, each road furnishing cars and receiving pay for the work in proportion to its mileage in the route.

The New York state freight business, known as "State Freight," is managed by the local agents of the railroad and its branches using New York Central & Hudson River Railroad cars.

The terminal freight stations of this road are:

The lighterage station and terminal yard at Sixtieth street, on the Hudson River (see double-page engraving).

The city stations at Thirty-third street (see double-page engraving) and at Barclay st., both also on the Hudson River, and the station at St. John's Park (bounded by Beach, Laight, Hudson and Varick sts.) and one at Pier 5, East River.

The Brooklyn station is on the Williamsburgh docks.

SIXTIETH STREET TERMINAL.

The freight tracks of this railroad enter the city by running along the east bank of the Hudson River, at the foot of a rocky bluff, until they reach Seventy-second street, about 6½ miles north of the Battery. Between Seventy-second street and Sixtieth street, where they enter and run along the city street (Eleventh avenue), the tracks, still following the foot of a rocky bluff, skirt the lowlands which reach out to the river channel; and on this convenient site within the city limits, yet free from city streets and business, was located the principal terminal yard, with its accompanying freight docks and sheds, grain elevators and stock-yard, arranged as shown on our double-page engraving. The site was formerly under water and unoccupied until 1877, when Elevator A was built, and in 1879 Elevator B. From that time the works were extended till 1882, when the last shed, "G," was built. The elevation of the main tracks is about 18 ft. above main high water, and the general level of the docks and yard is 8 ft. above the same level. Hence the yard tracks have 10 ft. fall towards the river. The foot of the steepest part af this grade is shown approximately by the dotted lines on the plan. The line of the bulkhead wall follows a little west of and parallel to the line of Twelfth avenue, and the piers extend from it at an angle of 60° to the southwest. At low tide the water is 16 ft. deep at the bulkhead. Elevator A is located on the bulkhead, and delivers to boats on the river-side and elevates from canal boats at the south end. It was originally intended to make city delivery to wagons on the east side, but this was abandoned as unnecessary. Elevator B is located on its own pier and delivers to boats on both sides of it. The total area of

this property is about 57 acres, of which the piers and elevators occupy six acres, the stock-yard and abbatoir 13 acres, store-house one acre, and yard 37 acres.

The original tracks leading to Elevator A were built on trestle work, but when the yard room was extended it was filled with sand brought by train from Croton, 37 miles up the river. Some ashes and city refuse were used in the northern part of the yard and also back of the bulkhead. The tracks are of good material, laid with stub switches and rail frogs. There are 22 miles of track in this yard (exclusive of the siding running north to Manhattan, 2¾ miles) divided as shown on the plan. The bulkhead is constructed of timber crib work filled with stone, which was sunk in a trench dredged for the purpose. The cribs are about 40 ft. in height The piers are constructed of pile bents, 7 ft. 10 in. spans centre to centre, with an extra number of piles on the north line to protect them from floating ice. The sheds on Piers D, E and F, are used for transferring east-bound freight to lighters and vessels and for temporary storage. They are two story timber structures, sheeted with corrugated iron; the general construction of these piers and sheds is indicated on Fig. 1. There are no posts in the centre of the lower platform, the second story being supported by rods from the roof; the floor joists are calculated to hold a load of 400 lbs. to the square foot.

Shed G is of somewhat different construction and is used in transferring west-bound freight from lighters and barges. It is only one story and the tracks are on the outside, as shown in cross section on Fig. 2 and in plan on Fig. 3. The piles for the foundation of Elevator A* were driven regularly over the whole site about 2½ ft. apart, and then cut off near low water, and a platform strong enough to distribute the load laid over the whole; from this platform stone piers were erected as supports for the posts of the timber frame work. The outside walls of this elevator are of brick-work.

Elevator B has a somewhat different foundation. The piles were driven in clusters of 25 in a space 10 × 10 and cut off about 30 ft. below the water. The stone piers to support the posts were then built on separate platforms, suspended by rods and lowered as the masonry was built. This elevator is entirely constructed of timber framework sheathed with corrugated iron and slate.

Each elevator cost about $500,000.

Operation of the Yard.—East-bound Freight.—The east-bound freight train with cars for this station is switched from the main line to the siding marked "section" where the road engine leaves it, and the caboose is run to the track marked "caboose." The "section" siding extends northward about 2¾ miles and is used for the reception of trains in the busy season, but that section of the track on which the trains in general arrive only holds one train; therefore, it must be quickly distributed in the yard. The way-bills are received in advance of the train, and hence the contents and destination of the cars are known, and the number of the track on which each car is to be run in the yard is at once chalked on the side of the car; a man known as a "pin-puller" draws the pins according to the destination in the yard, and the great number of tracks allows of an excellent system of classification. Grain cars are sent on the tracks marked "Grain yard," and there are also separate tracks for other staples, as a cotton track, a tobacco track, flour tracks, and so on; thus the same kinds of freight are kept together, saving much labor in the freight house.

The yard engine is run behind the train on the section track and pushes the cars slowly forward, each section of the train as it is cut off having a brakeman to control it. The only duty of the engine is to push on its own track, for as the grade falls from each switch, the car runs to its destination without further aid. It is there coupled to the car ahead of it so that in case of fire the yard can be quickly

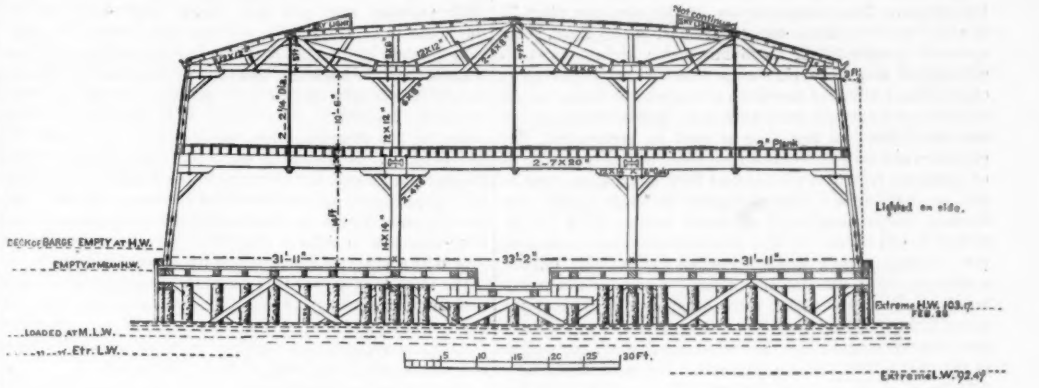

Fig. 1.

PIERS E AND F, SIXTIETH STREET STATION—Cross Section.

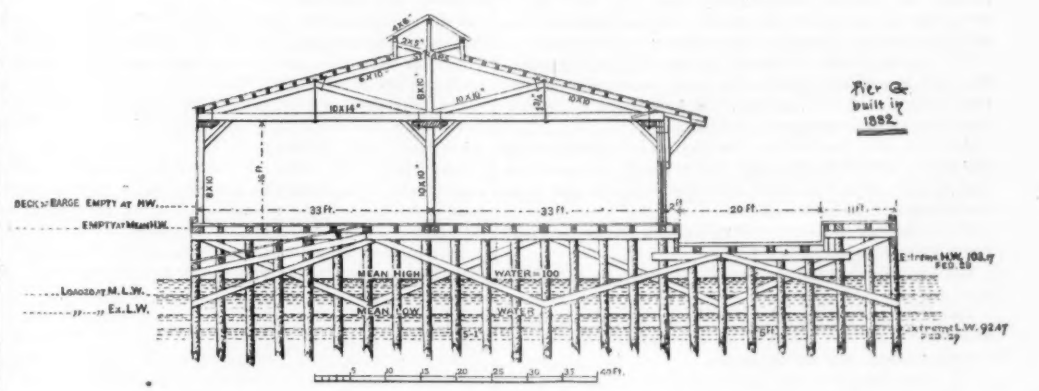

Fig. 2.

PIER G, SIXTIETH STREET STATION—Cross Section.

pier, according to the freight which he has to load. On account of the different lengths of the cars, it is often necessary to uncouple in order to make the doors of the cars on both tracks coincide; hence two engines work at a time, so that as soon as a train of loaded cars is pulled out a train of empty cars is pushed in, thus causing little delay to the men in the house. All west-bound cars from all stations are sorted on the 26 tracks marked "West-bound yard." The building of the store-house shortened the yard so that none of the tracks hold a full train, but in other respects it is very easily operated. The cars are delivered into it by gravity, and each track is used for a special route and is designated by a number. The brakeman on a car bound for a certain track as he enters this yard signals the number of the track by hand signals to the three switchmen who control the yard, and the whole work is done very quietly and systematically.

In pulling up the grade out of this west-bound yard, the yard engines are obliged to assist the road engines. Trains are sent out of this yard directly for Chicago, the only further yard work being the changing of engines and cabooses on the different divisions.

About 900 loaded cars are at present moved in one day, but with the same equipment 1,000 cars are frequently

This whole force is largely increased during the busy winter months, eight engines being then used.

Operation of the Piers.—Almost all the railroad business with the New York city docks, and all the business with the Brooklyn storehouses and other points in the harbor is done by means of lighters or barges generally holding about 450 tons. There are two lighters used by this company for quick delivery of small lots of freight, which have both steam hoisting and propelling apparatus, but, as a general thing, the lighters are moved by separate propellers. Ocean steamers and large vessels having regular docks do not leave them. The tracks of this railroad enter some of these docks, but for reasons mentioned in the introduction the movement of freight is not always direct, and even with bulk cargoes the freight is transferred by lighters. Grain is transferred from the lighters to the vessels by floating steam elevators, and miscellaneous freight by steam-hoisting apparatus, either on the vessels or on the shipping dock, where they are very general. Independent sailing and steam vessels, which have no regular docks, transfer freight directly at these railroad docks, however; hence the slips are kept to a sufficient depth. Before these piers were constructed the city lighterage was carried on at the Thirty-third street station, and the export lighterage of grain, and

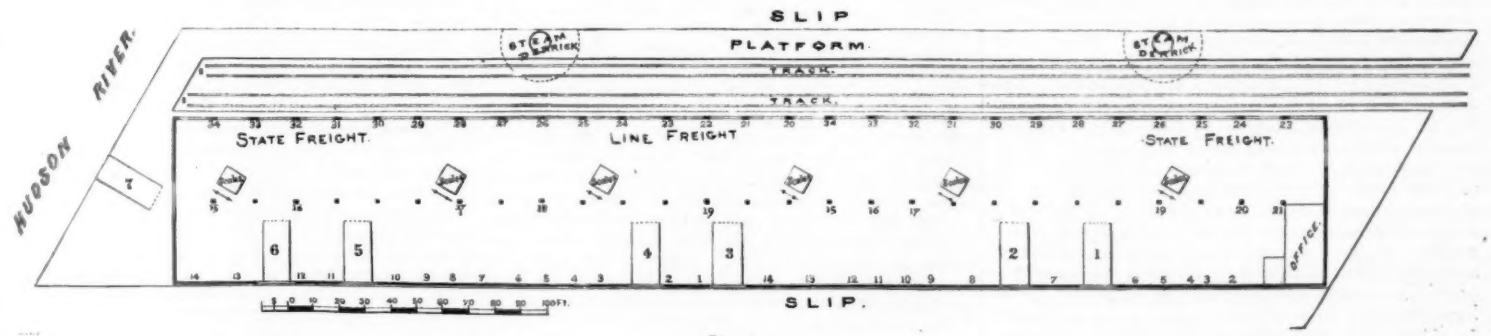

Fig. 3.

PIER G, SIXTIETH STREET STATION—Plan.

emptied. Each track is numbered in connection with the letter of the pier, and it is the duty of one man to take and keep in a book the position of every car from the bumper block on every track throughout the yard. The empty cars from the freight houses which are to be reloaded with west-bound freight are placed on the track marked "empty yard"; if they are to return west empty they are run into the west-bound yard.

The cars can be run from the yard tracks into the freight sheds and elevators by gravity, although it takes an engine to put them in position in the elevators and at shed G.

West-bound Freight.—The empty cars are delivered to the west-bound freight house G, first according to the general arrangement of the house, which will hereafter be shown, and then by the special orders of the foreman of the

handled. Each car, from the time it enters the yard until it leaves to return, is moved eight times in the regular course of business.

The following is the force at work:

	Day.	Night.
Engineers	4	4
Conductors	4	4
Locomotives	4	4
Brakemen	35	35
Switchmen	28	28
Pin-pullers	4	4
Chalkers	1	1
Car record clerks	4	4
Yard-masters (assistants)	4	4
Yard-master	1	1

There is an assistant yard-master each for the east-bound, grain, and empty yards. The regular yard engine weighs about 26½ tons all on four drivers, the total weight, with tender loaded, being about 40 tons; it consumes about four tons of coal in 24 hours.

other "bulk" freight from Athens, about 115 miles up the river, and only 30 miles below Albany.

Operation of the East-bound Freight Piers C, D, E *and* F.—Pier C is out of the way, and is not used now except in case of necessity. Pier D is used for east-bound miscellaneous freight, such as provisions and manufactures, and occasionally for some west-bound freight, such as railroad iron transferred directly from vessels. Pier E, which is shown on fig. 1, is almost entirely devoted to export dry freight, such as flour in sacks, and oil cake, etc. On pier F are handled barreled flour and other freight for local use or storage. All export flour is inspected on these docks. In 1883, 2,552,881 barrels of flour were brought to New York by this railroad. On all these piers the freight is moved by hand trucks (except barrels, which are rolled on the floor), but the operation of the yard and the fact of the freight coming in large lots avoids long trucking to a considera-

* Further particulars and diagram of the arrangement of Elevator A will be given in a future article.

ble extent. The second stories of the sheds on piers D, E and F are in constant use, the freight, mostly flour, being elevated in each by six Bates automatic elevators, which are hinged sheet-iron platforms mounted on endless iron chain belts, similar in operation to a grain elevator. As it requires an additional gang of men to handle the freight on the second floor, the first floor is used in preference. The elevators are very economical, however, and save the work of piling the freight, as the second floor more than doubles the storage area. The elevators in each house are worked by one engine of 45 horse power, 16 × 24 in. cylinder, at about 40 lbs. pressure and 70 revolutions per minute. Each engine has an adjustable cut-off, regulating the amount of steam used to the work required. At the usual rate of speed, each elevator raises 500 barrels an hour. The freight is lowered by the same contrivance, except that no steam is used; the weight of the load carries it down, the speed being regulated by a foot brake on the second floor, and 500 barrels an hour are lowered by each leg per hour in the regular course of work. Most of the freight is moved to the lighters by hand trucks, but when the tide is low (as indicated on plan No. 2), the deck of the vessel is considerably below the level of the dock, and the freight is slid down a plank from the dock stick and packed by another gang of men on the lighter.

The total floor area of sheds D, E and F is 234,500 square feet, which will accommodate a daily movement of 150 cars, or about 1,500 ft. per car, which is probably equivalent to an average storage of four days.

Barreled oil is handled on the platforms between the oil tracks, the barrels being easily rolled along on top of two lines of rails laid 16 in. apart, and thus moved to and from the lighters at the bulkhead.

Export timber is transferred to lighters at the bulkhead track back of the round-house.

The coal wharf is for transferring locomotive coal from lighters.

Live stock is run directly into the stock-yards; as these and the abattoir are operated by a separate company, no description will be given of them.

The tracks near the office, marked "bulk," are used for car loads of east-bound freight, such as lumber, received for local use in this part of the city.

West-bound Freight.—The lay-out of the west-bound freight house G is shown on figs. 2 and 3. The greater part of the work at this house is done at night, as most of the freight is collected during the day at the Brooklyn, Jersey City and New York city docks, arrives at this dock in lighters about 7 p. m., and is unloaded, sorted, weighed and loaded in cars generally before 4 o'clock in the morning, and is always on the road before 7 o'clock. The house is nicely whitewashed and admirably lit by electric lights, 30 of which are distributed around the works, the company operating its own machine on the premises.

Five regular boats run to this house every night. One boat carries line freight from the Barclay street dock; it is unloaded at doors Nos. 3 and 4†. Another barge brings state and line freight from Pier 5, East River, and is unloaded at doors Nos. 1 and 2. Another carries sugar from the Williamsburgh refinery, 2,000 barrels at a time, and is unloaded at doors Nos. 5 and 6. Another boat coffee from Brooklyn store-houses, and still another during the day brings miscellaneous freight from Brooklyn. There is frequently also a barge from the Jersey City sugar refineries. There are also a great many irregular boats from the docks and warehouses of the port, but the above are almost constant.

Lighters carrying freight which does not require weighing or sorting lie on the north side of the pier, and the freight is transferred directly over the narrow uncovered platform. On this platform are two steam derricks, capable of handling pieces up to four tons in weight, such as barrels of soda ash and sugar, and paper stock. There are no quick-acting derricks for smaller freight, however, and that kind is unloaded by hand, unless the lighter has a steam hoist and gaff boom, in which case quick delivery can be made. Five hundred barrels an hour can be regularly raised in the last mentioned way with one boom. Miscellaneous freight is unloaded on the south side from the barges into the house by hand trucks, which are run up the gangways shown on the left hand side of fig. 2. The lift is very variable, and at low tide men are stationed in each gangway to help the truckmen, but these additional men are afterward used in the regular gang loading the cars. The gangways coincide with the doors in the barges, and the truckmen enter the boat by one gangway and haul out by the other. The sugar boats are unloaded by rolling the barrels, and at low tide two men are necessary in the gangway to each barrel. Twenty men can unload 2,000 barrels in two hours when the tide is high, and in four hours when the tide is low.

As a general thing, the freight requiring sorting is first handled; at the head of the incoming gangway is a switchman, who tells the truckmen at what number to put the freight, each number designating a certain place and route. After the freight is sorted it is loaded, which is done one car at a time by each gang of six men and a tallyman. The tallyman who stands at the scales has the duplicate shipping bills, which have been sorted in the office, and those for each car put in a separate envelope. These envelopes are indorsed, giving car, route, tallyman, etc., and when the car is loaded the envelope is taken to the office, the indorsement recorded in a book, and a memorandum way-bill made out, and all compared afterward by the man who cards the car. The duties of the tallyman are to weigh each package and put the weight and tally on the duplicate bill. He simply follows and checks the duplicate receipt; he does not make an independent record from inspection of the package, and thus avoids errors in description of the freight and works quickly, except in cases where the freight is piled so that it is hard to follow the order of the shipping bills, which is very seldom the case in this house. In handling sugar or other freight which comes in large lots, but so mixed in the loading in the barge as to require sorting, the lay-out of the house cannot be adhered to, and hence the foreman of the house instructs the yard-man how to deliver the cars. Twenty-eight cars are loaded at a time, the north string being loaded first.

The total area of shed G is 28,600 square feet, which will accommodate a daily (12 hours) movement of 120 cars, of nearly 240 square feet per car, hence the movement of this freight is so rapid that it requires no more room to weigh and sort it than is necessary to haul it in the car.

Organization—East-bound Freight.—There are employed on each of the docks D, E and F one engineer (one of whom also works the steam derrick on F and G); 30 laborers, who are paid by the time worked, 17 cents an hour; two tallymen, and one clerk.

A slip is made out for each consignment in the car and checked by the tallyman as the car is unloaded; it is then sent to the main office and destination marked on it, and the goods shipped accordingly. The tallyman also records in a book the freight as it is unloaded from each car. The regular work of the men on the east-bound freight is to unload the cars and pile the freight in the house, and to load the freight stored in the house into the regular company barges. Taking both these operations into account, a good average work in ten hours is the unloading of a car of freight to each laborer, but it varies greatly according to the freight and the room in the house. Twenty-five men will unload 50 cars of oil, and taking the whole work the average work of a man would probably be from 1¼ to 1¾ cars a day.

On west-bound freight at pier 4, the night force is generally 85 laborers and 20 foremen, tallymen, and clerks, and the average work is the loading of 120 cars in 10 hours. The day force is 20 men, and in 24 hours 160 cars are loaded at this pier.

The work at this pier is well arranged and concentrated. The freight comes in large barge-loads and not by the dray-load, as at city stations, and hence the men are kept steadily at a regular routine and work effectively.

THIRTY-THIRD STREET TERMINUS.

The general arrangement of this yard and the adjacent freight shed, etc., is shown on the upper portion of our two-page engraving. The freight yard is on the Hudson River, 4½ miles north of the Battery and two miles south of the Sixtieth street yard. These works have grown up around the old passenger and freight station of the Hudson River Railroad, and have been enlarged as necessity required, and, as shown on the plan, the site is intersected by several city streets. There are about 26 acres in the whole property. The new piers have not yet been constructed and no plan of permanent occupation has been adopted; hence in these respects it is a contrast to the Sixtieth street terminal. It is conveniently located as a city station for the up-town trade and a large portion of the manufacturing districts.

A branch track at Forty-first street, about half a mile to the north, runs into a large slaughter house and pork-packing works. On the south, a double track branch runs down Eleventh avenue to Twenty-seventh street, about a quarter of a mile, and along this branch (which is used for transferring car-load freight) are lumber yards and iron works. There is also a siding about 120 ft. long on Tenth avenue, about a mile south, just below Twelfth street and near the vegetable market, and another (half a mile further south, on West street), 3,000 ft. long, between Barrow and Spring streets, with branches into the piers of the White Star, Inman and Guion lines of transatlantic steamers.

There are about six miles of sidings in the yard and piers.

There is nothing to be noted in the construction of these piers and sheds, for, as the piers are not permanently located, the old sheds have simply been kept in running order, and such changes in the track made as found necessary. After the Manhattan market (built by the city) was burned, this company bought the site and erected two-story brick buildings along the streets, divided by brick partitions into rooms about 60 ft. square. They have platforms on both the track and street sides. The hay sheds are wooden sheds covered with corrugated iron, open on the track side and with doors on the streets.

Operation of the Yard.—The Thirty-fourth street yard is used to distribute cars both to the sheds here and the down-town stations. The car floats running to the Barclay street pier are loaded and unloaded here, and the cars to and from the large city station at St. John's Park and the steamship docks are moved from this yard. The trains on the Hudson River Division come solid for this station, the cars being arranged in the train according to destination, all the cars for each of the down-town stations being together. The road engine leaves the train at the Seventy-second street engine-house, and the Thirty-third street yard engine hauls a train of 20 cars to Thirty-third street, returning empty for another train. The details of the operation of the yard are as far as possible the same as at Sixtieth street. The yard is smaller and not arranged in a general plan, and no west-bound cars are sorted here.

The St. John's Park freight is handled on tracks marked "P," the Barclay street on "B," etc. South of this yard dummies are used, each moving 10 cars to the steamship docks and St. John's Park station.

The total force in the yard night and day each consists of four engines and 75 men, handling 250 west-bound and 325 east-bound loaded cars a day.

The 10 dummies used here are covered tank-engines, weighing about 24 tons. Six are in constant use, two working at St. John's Park, three between this yard and St. John's Park, and one to the steamship docks. These latter are flagged by a boy riding on a horse in front of the train. There are 33 train-men and yard-men employed in the dummy department.

One engine is kept on east-bound trains and another on west-bound trains between this yard and the Sixtieth street yard, with seven flagmen stationed at the principal street crossings. The speed of these trains is not greater than five miles an hour.

Operation of the Freight Houses in General.—A large quantity and a great variety of local business is done at these yards, and also a considerable lighterage business in provisions and lumber. This station is conveniently located for supplies actually consumed in the city, and is near the store houses both by land and by water.

The down-town business of the city consists largely of westward shipments of goods by foreign importers or commission merchants.

Pier 1 (the most southerly) is used for lighterage freight. The south platform is used largely for tobacco in hogsheads, and the north platform almost exclusively for the business of a Western firm dealing in boxed meat transported in refrigerator cars. Their agent sells in the city, and it is delivered either for foreign export or local use. The floor area is 42,000 square feet. Sixty cars are handled here in a day, or 700 square feet per car. The average length of storage is about two days.

Pier 2.—The position of the track allows for direct transfer to lighters on the north side and to platform on the south. Lumber and provisions are mostly handled here. The floor area is 16,000 square ft. Thirty-five cars can be handled here in a day.

Pier 3 is uncovered, and is used for the direct transfer of car-load lots—lumber mostly. Heavy freight is handled at the end of the pier by the ten-ton derrick, worked by hand.

Shed B.—This is for miscellaneous east-bound freight for local use. The freight is unloaded and piled in the shed till removed by the consignee. The floor area is 20,000 square feet, and 40 cars can be handled here conveniently in 12 hours, or 500 square feet per car, showing an average storage of 1⅛ days.

Hay Shed No. 1 is for storing such hay as is not directly delivered to consignees.

Hay Shed No. 4 is the regular hay market, and is leased in sections to the hay-dealers who unload their own cars. The only work required of the railroad company is to arrange the cars in the train according to the consignees' location in the shed. About 4,000 bales, or 40 cars, are handled every day, on an average, throughout the year.

Manhattan Market.—The building on Thirty-fourth street is entirely devoted to the potato business, and is operated in the same way as the hay business. The average number of cars unloaded here is 55 cars a day for the months of September, October, November and December. There are also received here during the same months about five cars of turnips and five cars of cabbage every day. On the Thirty-third street side are the dealers in beef, slaughtered and dressed in Chicago, and transported in refrigerator cars, each piece hanging from the roof. It is here run, suspended from overhead tracks, into refrigerator rooms, where it is kept till sold. They average 130 pieces of 160 lbs., or about 10 tons to a car-load.

Shed A.—This is for west-bound freight delivered by city drays. Its floor area, including the wide platform which is used for a truckway, is 10,000 square feet, on which 70 cars can be conveniently handled in 12 hours, or 150 square feet per car.

The general operation is similar to that of Pier G, Sixtieth street, except that the freight comes in dray-loads throughout the day. Car-load lots of west-bound freight are loaded directly on the cars on the "bulk" tracks. There is one six-ton hand derrick in the yard.

There are 81 laborers, checkmen, etc., employed on the east-bound freight, working 11 hours a day and handling 95 cars on the docks and in the sheds.

On west-bound freight there are 20 laborers and tallymen, handling 65 cars and working 11 hours. A large portion of this freight is loaded directly on the cars, and does not pass through the freight house.

GRATZ MORDECAI.

(To be Continued.)

†Plans and descriptions of these freight stations will be given in a future issue.

ANNUAL REPORTS.

The following is an index to the annual reports which have been reviewed in previous numbers of the current volume of the *Railroad Gazette*:

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Lehigh Valley.

The following figures for this company's fiscal year ending Nov. 30 last are from the statements read at the annual meeting this week, in advance of the publication of the full report.

The capital account is as follows:

Preferred stock		$106,300
Common stock (including scrip)		32,848,620
First-mortgage bonds	$5,000,000	
Second-mortgage bonds	6,000,000	
Consolidated bonds	13,686,000	
		24,686,000
Total		$57,640,920

The bonded debt decreased $168,000 during the year. The company has no floating debt, the cash on hand exceeding the current accounts and outstanding bills.

The income account for the year is as follows:

	1884.	1883.	Decrease.	P. c
Receipts from all sources	$10,186,351	$11,310,172	$1,123,821	9.9
Expenses of road	5,246 073	6,175,656	929,583	15.1
Net income	$4,940,278	$5,134,516	$194,238	3.8
Net income as above				$4,940,278
Interest, including guaranteed bonds			$2,057,2 8	
Interest, taxes, loss on canal, etc			473,355	
Dividends, 8 per cent			2,372,242	
				4,902,805
Balance, surplus for the year				$37,473

The net income was thus sufficient to pay the usual dividends and leave a small balance. No charge was made to depreciation account.

The earnings and expenses of the railroad lines were as follows:

	1884.	1883.	Decrease.	P. c.
Earnings	$8,948,207	$10,218.150	$1,269.943	12.4
Expenses	5.246,073	6.175,656	929,583	15.1
Net earnings	$3,702,134	$4,042.494	$340,360	8.4
Per ct. of exp's	58 6	60.4	1.8	....

The decrease in net earnings was comparatively small, owing to the large reduction in working expenses.

The coal tonnage for the year was as follows:

	1884.	1883.	Decrease.	P c
Anthracite	6,008,999	6,527,912	518.913	7 8
Bituminous	59,968	64,734	4.766	7.3
Total	6,068 967	6,592,646	523 679	7.7

Coal mining was suspended 104 working days during the year, or nearly one-third of the time.

The passenger travel shows an increase of 11 per cent. over the previous year, and the general freight traffic (excluding coal) a decrease of 8.3 per cent.

Illinois Central.

At a meeting of the directors of this company, Jan. 21, an approximate statement of the business for the year (December being estimated) was presented. The gross earnings were:

	1884.	1883.	Decrease.
In Illinois	$6 187,788	$6 674 703	$486,915
Southern Division	4,318,218	4 364,930	46,712
Lines owned	$10,506.006	$11,039,633	$533 627
Iowa Division	1,704 048	2,025,110	321,062
All lines	$12,210 054	$13,064,743	$854,689

Three-eighths of the total decrease is on the lines in Iowa leased for a percentage of their gross earnings. The net result to the Illinois Central Railroad Co. of operating these lines has been a loss of $33,000, against a profit in 1883 of $35 533.

The net earnings from traffic have been:

1884	$4.796,000
1883	5,264.157
Decrease	$468,157

The net receipts from all sources have been as follows:

Surplus dividend fund, as shown in last report	$156,909
Traffic	4,796.000
Lands	87,182
Interest on investments, premiums on bonds sold	223,000
Total	$5,263,091

From this sum there were paid:

Interest on debt	$546,900	
Bonds drawn under sinking fund	50,000	
Rental Chicago, St. Louis & New Orleans	1,491,500	
Permanent improvements in Illinois	143,000	
Permanent improvements on Southern Division	77,000	
Swedge block judgment	115,000	
		$2,423,400
Leaving net		$2 839,691
Dividends, 8 per cent		2,320,000
Leaving as a reserve from the year's earnings		$519,691

Of which there has been set aside to pay for purchases of additional equipment, $250,000, and the balance, $269,691 carried forward to surplus dividend fund, and held applicable to next succeeding dividend.

Philadelphia & Reading.

The earnings and expenses of this company, for the fiscal year ending Nov. 30, were as follows, by the statement in the manager's report, which differs slightly from that of the Receivers, which was given last week:

	Earnings.	Expenses.	Net earn'gs
Railroad traffic	$20,055,875	$16,875,003	$12,180,832
Canal traffic	717,171	502,985	214,985
Steam colliers	441,565	455,679	*14,094
Richmond barges	60.536	65,981	*5,445
Income from stocks and bonds	679,133		679,133
Total	$30,954.240	$17.899.629	$13,054.611
Coal & Iron Co	16.496,608	16,154.884	341,024
Total	$47,560,848	$34,054,313	$13,396,535

* Deficit.

"The business of the Reading Railroad Co. and of the Reading Coal & Iron Co. during the year was of great magnitude. They gave employment to about 46,000 persons.

The gross earnings were	$47,450,849
The gross expenses were	34,054,314
The business resulting in net earnings of	$13,396,535

"The proportion of earnings to expenses on the railroad was 59.1 per cent., and in the Coal & Iron Co. 97.9 per cent.

The net result for both companies was as follows:

	1884.	1883.	Inc. or Dec.	P.c
Net earn. R R Co.	$13,054,611	$14,461,071	D. $1,409,460	9.7
" " C. & I. Co.	341.924	921,772	D. 579,848	62 9
Total	$13,396,535	$15,385,843	D. $1,989.308	12.9
Rentals, R R Co.	$9,530 619	$6,412.427	I. $3,118,192	48.6
Interest, R. R. Co.	6,078,881	5 689.240	I. 389.641	6.8
Interest, C. & I. Co.	1,142,286	1,156.943	I. 15,342	1 4
Total charges	$16,751,787	$13,228,610	I. $3,523,176	26.6
Surp. or loss	L. $3,355,251	S. $2,157,233	D. $5,512,484	. ..

The following extracts from the report are given, in addition to those published last week:

"The operations of the Reading Railroad Co., deducting that of the system of the Central Railroad of New Jersey, have resulted in

Net earnings	$8,608,630
Total fixed charges	9,689,287
Deficit for the year	$1,080,657

"The business of the Reading Coal & Iron Co., has resulted in

Net earnings	$341,024
Total fixed charges	1,142,286
Deficit for the year	$800,362

"The following statement exhibits the result of the operation of the system of the Central Railroad of New Jersey during the year, including in the fixed charges the dividend of 6 per centum under the terms of the lease of May 29, 1883:

Coal traffic	$5,309,130
Merchandise traffic	2,476,673
Passenger traffic	2,236,289
Miscellaneous	419,003
Total earnings	$10,441,095
Expenses	5,995 114
Net earnings	$4,445,981
Less rent { Fixed charges	$4,806,421
{ Dividend	1,113,792
	5,920,213
Deficit for the year	$1,474,232

"The above statement, showing the earnings of the Central Railroad system, is made upon a strict *pro rata* basis, without allowing anything for terminals, or for the service of the rolling stock of the Central Railroad Co. of New Jersey upon the Reading lines, and it takes no account of a large amount of traffic which, for its own purposes, the Reading Railroad Co. has diverted from the Central Railroad, at Bound Brook, 30 miles from New York, so as to take it by the main line of the Reading Railroad instead of transporting it, as was previously the case, *via* Phillipsburg, 75 miles, or *via* Tamanend, 130 miles, on the Central New Jersey system.

"For the purposes of comparison the following table of the coal tonnage is given, showing the amount of coal tonnage of the Reading and Central systems respectively:

	1884.	1883.	Decrease.	P. c.
Reading R. R.	6,578,047	7,610,546	1,032,499	13 6
Central R. R.	4,459,042	4,859,710	400,668	8.2
Total	11,037,089	12.470,256	1,433,167	11.5

"During the year 1884 the passenger traffic on both the Reading and Central roads was greater than in the year 1883, the net increase from this source being $102 415.

"The quantity of merchandise carried in 1884 was, relatively, not so great as in 1883, and as it had to be transported at lower rates, the net results are considerably less: the falling off in this respect being mainly due to the depression in the iron and manufacturing industries.

"During the year a large sum was required to be expended in strengthening the bridges on the various lines, particularly on Bound Brook and main lines of Central Railroad of New Jersey and also in the improvement of the tracks acquired under the lease of the latter road. The roads embraced in that lease were, in many cases, in such condition as to require large expenditures, in order to bring them up to the state of efficiency required for a first-class passenger traffic.

"Prior to the appointment of the Receivers in June, 1884, the Reading Coal & Iron Co. had constructed, for the railroad, passenger, freight, and coal cars to the value of $1 138,592. These were sold to the Union Trust Co. of Philadelphia, and a car trust created by that company, whereby the cars were leased to the Reading Railroad Co. The trust certificates are payable in 10 annual instalments, and upon compliance with the terms of the trust the cars will become the absolute property of the Reading Railroad Co.

"The connections to be established with other systems of railroads, by which it is believed a large business will be thrown upon the lines of your company, are in a satisfactory state of forwardness. The Baltimore & Ohio Railroad being completed to Philadelphia during the year 1885, thereafter a direct connection will be established with the system of roads operated by the Philadelphia & Reading Railroad Co. This will open up a great extent of territory from which this company is now completely excluded.

"The South Pennsylvania Railroad, which will connect your line of roads with the line through Western and Southern Pennsylvania to Pittsburgh and the West, is being pushed to completion, a very large amount of money having been expended thereon during the year just closed.

"The line to Buffalo and the Northwest, established last year, connecting by means of the Shamokin, Sunbury & Lewisburg Railroad with the railroads of Western Pennsylvania and New York, with which your company is in friendly alliance, has developed a considerable increase in business during the present year, and bids fair, when the business which will be tributary to it is fully developed, to be a source of considerable revenue to your company.

"The Philadelphia & Atlantic City Railroad, leading from Camden to Atlantic City, was changed from a narrow to a standard gauge during the year. This will be of undoubted benefit, as it permits of an interchange of the business of the system of the Central Railroad with that of the Reading, and gives to the former a terminus at Camden, N. J. * * *

"It cannot be denied that the system of mining coal under which this company has been operated, in consequence of its relations to other mining companies, for several years for various reasons, has deprived it of its proper share of the coal output. It is believed that under amicable arrangements with rival companies its proper share of tonnage can be alone secured by such arrangement as will give to the companies a fixed proportion of the total output, thereby enabling this company to reduce the number of its collieries and concentrate its operations at the most profitable, working them full handed all the time. By doing this the expense of mining can be decreased so as to render this branch of the company's business a source of revenue instead of outlay.

"The protection of the collaterals pledged for the company's indebtedness from sacrifice has engaged much of the attention of the Managers, and, since their appointment, of the Receivers. The amount of their collateral securities, at their par value, so pledged, on Nov. 30, 1884, was about $34,000,000.

"So successful were these efforts, made under the greatest difficulties, that except in the case of the New Jersey Central stock loan, not over $110,000 of these securities were disposed of by the holders thereof during the entire year."

Buffalo, New York & Philadelphia.

This company owns lines from Buffalo, N. Y., to Emporium, Pa., 121 miles, and from Buffalo to Oil City, Pa., 140 miles, with 179 miles of branches. It leases the Genesee Valley road, from Rochester, N. Y., to Hinsdale, 99 miles, and eight short lines in the northern oil region, making 99 miles together. It also leases the use of 30 miles of the Philadelphia & Erie and 6 miles of the Jamestown & Franklin track. The total mileage is 440 miles owned and 234 leased, 674 miles in all. The report is for the year ending Sept. 30.

The present company was formed in February, 1883, by the consolidation of the Buffalo, New York & Philadelphia, the Buffalo, Pittsburgh & Western and several minor companies.

The equipment consists of 118 locomotives, 120 passenger-train cars, 5,519 freight cars and 18 service cars.

The general account is as follows, condensed:

Stock, common		$13,750,000
Stock, preferred		6,569.522
Funded debt		24,500,000
Real estate mortgages		598,454
Car trusts		1,970 577
Accounts payable		2.016,722
Miscellaneous		153,852
Total liabilities		$49,559,127
Railroad, equipment, etc	$28.848.416	
Real estate	594,198	
Leasehold estates	7,000.000	
Stocks and bonds owned by Co	3,398 525	
Stocks and bds. owned by Co., leased lines	4.657,300	
Bonds held in trust by U. S. Trust Co	3,100,000	
Deferred interest car trusts	469.018	
Bills and accounts receivable	402,549	
Materials, fuel, etc	87 172	
Cash on hand	118,986	
Buffalo terminal land	110,338	
Coupons funded	103,735	
Profit and loss	588,385	
Miscellaneous items	80,065	
		$49,559,127

Stock remains unchanged; the funded debt was increased $1,200,000 during the year. This increase was offset by the disappearance of $1,175,093 "loans to be funded," which appeared in last year's balance sheet.

The traffic for the year was as follows:

	1883-84.	1882-83.	Inc. or Dec.	P. c.
Passengers carried	1,173.439	1,102,363	I. 11.076	9.9
Passenger-miles	27,181,709	27,011,591	I. 170,118	0.6
Tons freight carried	2 376,534	2,627,959	D. 251.425	9.6
Ton-miles	211,040,876	171,975,117	I. 39,065,759	22.7
Average rates:				
Per pass.-mile	2.820 cts.	2.900 cts.	D. 0.080 ct.	2.8
Per ton-mile	0.788 "	1.052 "	D. 0.265 "	25.1

The heavy decrease in freight rates was due to the very sharp competition for bituminous coal trade, which forced down the rates to a point sometimes below the cost of transportation.

The earnings for the year were as below:

	1883-84.	1882-3.	Inc. or Dec.	P. c.
Freight	$1.854,114	$1,810 733	I. $43,381	2.4
Passengers	691,876	730,886	D. 39,010	5.3
Mail, etc	68.784	61,999	I. 6,785	10.9
Total	$2 614.774	$2,603,618	I. $11,156	0.4
Expenses	2,087,841	1.714,759	I 373,082	21.8
Net earnings	$526.933	$888.859	D. $361,926	40.7
Gross earn. per mile	3.879	3.945	D. 66	1.7
Net " " "	782	1.347	D. 565	41.9
Per cent. of exps	79.85	65 86	I. 13.99	....

The decrease in passenger earnings was due to low rates made to meet competition. The increase in expenses was due to the greater train movement and the large increase of freight at very low rates.

The income account for the year was as follows:

Net earnings, as above		$526,933
Interest and rentals received		42,300
Total		$569,233
Interest on funded debt	$1,275.935	
Other interest	130,751	
		1,406,686
Deficit for the year		$837,453

The condition of affairs shown above has made it necessary for the company to ask bondholders to fund a part of their interest for three years, and stockholders to subscribe for the unissued bonds in the treasury. These propositions have been generally accepted and will probably be carried out.

The report says: "The present management assumed charge of the property Feb. 1 last, which was at a critical period in the history of the company. It has made a hard struggle against terrible odds, and if supported by those whose interests it is to give support, the management can continue the struggle until success is reached, which may be at no distant day. If not supported and failure ensue, your present management cannot be censured, because they have stated the case fully to you. The expectations of your former management were based upon the natural increase of trade through a rich country contiguous to your lines of railroad, without sufficiently considering the effect of rival lines being built into their territory; rival lines, however, have since been built, and have consequently divided the business. The general depression in all branches of trade, augmented by ruinous competition, already referred to, has so crippled your company that it cannot at present meet its interest obligations in full; you have, however, a good property, capable of being worked up to much larger earnings, and with larger earnings the proportion of expenses will decrease, so that your management confidently hope and expect that the net earnings for 1885 will take care of fixed charges under the funding plan, which will amount to about $1,100,000, viz.: interest on bonds, $912,190; on bonds proposed to be issued to pay floating debt, $30,000; taxes and interest on car trusts, $140,000. The gross earnings for 1885 are expected to reach $3,000,000; operating expenses at 60 per cent., $1,800,000; expected net earnings for 1885, $1,200,000. This is not unreasonable if the facilities at terminal points are furnished.

"As stated in the last annual report, $1,700,000 of the general mortgage bonds negotiated late in 1883 were issued during the present year, and now appear in the general balance sheet; the proceeds were used as already stated. Of the $2,000,000 balance, $500,000 have been surrendered to the Fidelity Insurance, Trust & Safe Deposit Co., trustees of the general mortgage, in lieu of their release of the company's land at Buffalo, which has been sold to the Union Terminal Railroad Co., as hereafter explained. Of the $500,000 so surrendered, $450,000 of the bonds have been canceled (as certified to the New York Stock Exchange by the trustee), and $50,000 are held by the trustee for the benefit of the Buffalo, Pittsburgh & Western general mortgage bondholders until the maturity of their mortgage.

"The floating debt and current obligations of your company, as stated in the last annual report, were $2,057,436; as will be seen by reference to the general balance sheet in this report, the items at same date this year were $2,015,479. Of the $2,015,479, $1,485,990 represent bills payable, which are secured by collateral, to wit: $1,500,000 general mortgage bonds, $731,000 Union Terminal bonds, together with $425,000 Northwestern Coal & Iron Co. bonds, etc. Should the proposition to the shareholders to purchase general mortgage bonds at par not meet with a favorable response, the above collateral will, of course, be sacrificed. It is to be hoped, however, that the shareholders will view the matter in their own interests, and subscribe, as requested, to save their interest in the property. The assets of your company have been increased by the receipt of $1,000,000 of the Union Terminal bonds, in lieu of the land at Buffalo sold to the Union Terminal Railroad Company."

RAILROAD GAZETTE

Published Every Friday.

EDITORIAL ANNOUNCEMENTS.

Passes.—*All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.*

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

CULVERTS.

"The natural end of a tutor," says the Autocrat of the Breakfast Table, "is to perish of starvation. It is only a question of time, just as with the burning of college libraries." Similarly, one may say that the natural end of a culvert is to perish in some excessive flood. Judging from past experience, it is only a question of time with most of them. Indeed, we may even say that if some of a number of culverts are not carried away, they are not well designed. For it is in many cases impossible to know how much water the culvert will be called upon to pass; and if we were to make one five or ten or twenty times larger than all the known circumstances require, in order to provide for possible unknown circumstances, such as an unprecedented storm, or the change in a water-course, we should make our structure so costly that the difference in interest would much more than over-balance the losses from the washing out of an occasional culvert. Actually, the "factor of safety," which the good engineer leaves in fixing the size of his culvert, does not leave any margin for over-confidence, but rather is like the old factor of safety of life in bridge building—not in reality a factor of safety at all, but simply a factor of ignorance. The factor was six in bridge-building, simply because it was found that with a smaller factor bridges were not safe—for reasons better understood now than when the factor was established. No bridge-builder now imagines that his factor is 2 even, for if his sections were cut down one-half he would look with confidence to see the bridge fall, and probably would not long look in vain. He therefore spares no effort to "make each part as strong as the rest." He might, no doubt, build a bridge so strong that any nice balancing of parts would be needless, but in practice he does not.

In designing culverts, however, engineers sometimes imagine themselves to be taking the latter course when they are not. It is always possible, no doubt, to build a culvert which will, certainly, pass the largest flood. For example, where a 2 ft. arch seems but little too small, a 20 ft. arch is certainly large enough, but no engineer, therefore, proceeds to build a 20 ft. arch, or even a 10 ft. arch. What he does do is to contract the span in his mind, from the dimensions which he feels certain are too large, to the point where he is not certain that it is too large—which is the point where he is not certain that it will not be carried away if made smaller—in other words, until he has no margin of safety at all.

Moreover, we cannot afford to provide for all that may possibly happen in the course of 50 or 100 years. One dollar in 50 years, at 6 per cent. compound interest, multiplies 18½ times and in 100 years 180 times. One cent in 200 years becomes $3,208, and in 300 years $391,750, in even figures. Of course, the question is not purely one of finance, but also one of safety to human life; but even then it logically follows that, unless we are prepared to spend $391,750 to save a given danger now, we cannot afford to spend even one cent to save a similar danger 300 years from now.

All this simply to establish the fact that in designing culverts we have no margin for negligence, even in theory, and still less in practice; with the consequent plain moral that, even after we *think* we have given, or really have given, all the water way we ought, if, without increasing the cost of the structure, we can in any way dispose the same material so as to give as large water way with equal strength, or greater discharging capacity to the same water way, or less liability to being choked with rocks and brush, if even a little, it is in no case a thing to be neglected. No culvert is "large enough."

This premise, once admitted, leads to certain practical conclusions as a matter of course. Much that is objectionable in the design of culverts—apart from their execution—comes from starting in the beginning with a false premise; from saying more or less consciously, "I make all culverts abundantly large and take no chances. If I feel the slightest doubt I enlarge the water way, so that my factor of safety is many times larger than any little modifications of arch or wing-wall could give. Why, then, consider them?"

This attitude of mind is wholly false and dangerous, the more so for having a certain plausibility. The designer of a culvert does take chances. Indeed, if he be a good engineer, he must do so, and knows that he must and does. If he builds a hundred or two culverts he feels a moral certainty that some of them will prove too small and eventually wash out; but as he cannot foresee which ones, he rightly judges that he cannot afford to attempt even to make them all so large that none of them shall ever prove too small.

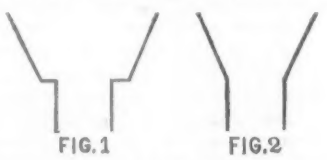


FIG. 1 FIG. 2

We can now readily see that, if our premise be correct, there are certain rules of design which need only to be considered in this light to be admitted:

1. There are two prominent methods of connecting the wing-walls to the body of culverts. To speak more accurately, there is one prominent way, fig. 1, and one occasional one, fig. 2, which latter is mainly confined to the practice of a few of the more careful officers of old lines—who see culverts go out as well as go in. It has penetrated but little as yet into the ranks of constructing engineers, and not at all, so far as known, into engineering text-books.

It needs but the slightest knowledge of hydraulics to see that if the culvert is ever to run nearly full, fig. 2 is the safer plan in every way. The sharp angles of fig. 1 very materially reduce the amount of water that can enter the culvert with a given head: on the other hand the splayed walls of fig. 2 increase the amount which can either enter or be discharged over that which can pass a mere straight opening. Hydraulic engineers always give a pipe for either receiving or discharging water a similar form if they wish to utilize its full capacity, while they avoid as about the worst of all the form shown in fig. 1.

In addition to its hydraulic disadvantages, the shouldered culvert end, fig. 1, is open to the further objections (1) that it affords a convenient trap for catching and holding driftwood or rolling stones at the most dangerous place where they can gather, and (2) that it is more costly. Every additional angle in masonry costs money, and adds to the price paid per cubic yard.

The form shown in fig. 1 was probably adopted, and has retained its prominence, from the supposed inconvenience of intersecting the battered face of a wing wall with the vertical face of an abutment, but the only difference in theory between the two plans is that in fig. 2 the intersection of the two planes will be an inclined instead of a vertical line lying in the plane of the abutment, and the only difference in practice is that there is no sharp intersection at all in fig. 2, but a slightly rounded angle.

The appearance of a culvert thus designed is generally admitted to be much improved. The eye instinctively recognizes its superior fitness for its work, which is the first essential for a pleasing effect.

2. There are three different ways of disposing the wing-walls for finishing the ends of culverts, the first of which (fig. 3) consists in running out the wing-walls nearly straight, such splay as they have being derived from the gradual thinning of the wall, the back line

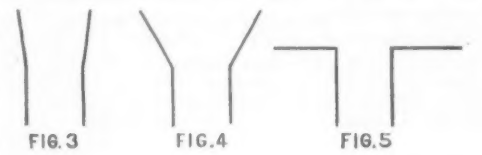


FIG. 3 FIG. 4 FIG. 5

of the abutment and wing-wall being one straight line; the second (fig. 4) splays the wing-walls at angles of 90 to 120 degrees to each other; the third (fig. 5) finishes the culvert with a straight wall at right angles to its axis. The amount of masonry used does not differ essentially in practice, but fig. 3 requires the least in theory.

The general plan (fig. 4) is much the most common, and from considerations already advanced it follows it is in general better than either of the other plans, provided there be no shoulder at the arch, as in fig. 1. It also follows that, provided there be splay enough to the wing-walls to take in the full natural width of the channel at high water, the less splay there is the better, as throwing less pressure upon the masonry, and affording better entrance to the water, with more probability of catching and detaining any floating driftwood, which otherwise might choke up the mouth of the arch.

3. There are two distinct types of arches for culverts: the semi-circular and the segmental, the latter in increasing, but still not common, use. The two types are outlined one upon the other in fig. 6, each type having precisely the same length of intrados. The leading dimensions of the two plans, assuming an even span of 10 ft. for the semi-circular arch, are as follows:

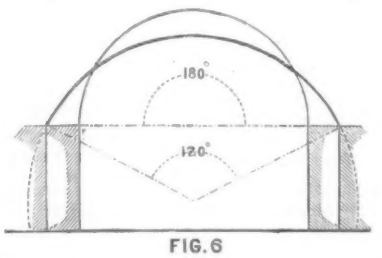


FIG. 6

Central Angle.	Length intrados.	Span.	Radius.	Water-way. Abuts.	Arch.	Total.	P. c.	Key-stone.
180°	15 71	10.	5.	50.	39.3	89.3	1.	1.00
120°	15.71	13.	7.5	65.	33.5	98 5	1.103	1.35
90°	15.71	14.14	10.	70.7	28.5	99.2	1.112	1.233

It is evident that, as a mere question of disposing of a given length of intrados, the segmental arch is materially preferable. It gives a span 30 per cent. wider, with proportionately less danger of being choked by obstructions. It will pass, consequently, say 35 per cent. more water for a given depth, at times of heavy discharge. If running full it will pass over 10 per cent. more water because of the greater area of opening and a slightly larger percentage yet—for a given hydrostatic head from back-water—because the centre of gravity of the opening is lower, in spite of the slightly larger wetted perimeter. Against this must be balanced the extra thickness of arch required, which, according to established rules and practice, for small arches of 5 to 15 feet spans, will be from 10 to 25 per cent. It is unnecessary to enter now into the details of precisely what difference ought to exist, for it will be evident that by any of the current formulæ, the segmental arch is, on the whole, much the better way of disposing a given amount of arch masonry to obtain the maximum discharge, especially if we remember that, for arches of this class, the price bid per cubic yard by contractors will be higher for thin arches than for thick ones, other things being equal.

But now as to the abutments: do they need to be made heavier? On the contrary, within the limits under discussion, they may even be made thinner, if deemed worth while, and yet afford equal strength; for the reasons following:

4. There are two distinct classes of abutments for arches, viz.:

(1.) Abutments whose sole or chief function is to resist the thrust of the arch, especially of large arches, and which resist, or are assumed to resist, no other strains exterior to them. If such abutments have a backing of earth, the thrust of which is opposed to the arch, this thrust is (very properly) neglected, as a possible but indeterminate element of safety.

This is the abutment of the text books, the theory of which has been studied primarily, in connection with the large arches of the Cabin John variety, which once played so important a part in civil engineering, but have now almost ceased to be built. In arches of

this class, it is evident enough, even to those not engineers, that the flatter the arch, for a given span, the greater will be its thrust against the abutment, and the heavier, consequently, the latter must be. The formulæ deduced in the past for arches of this class give dangerously light abutments when extended to small culvert arches, and yet they were frequently so extended—on the principle, perhaps, that what was a good enough formula for a big arch was good enough for a small one—as may be seen by consulting some of the older tables of theoretical dimensions and comparing them with established rules of present practice. These tables have now, happily, almost disappeared from the handbooks of engineering, as they did long ago from practice; the latter being now based wholly, for such structures, on rules of thumb which are not defended nor defensible by the "theory of the arch." This is but natural, since the small span abutments belong, in fact, so far as culverts are concerned, to an entirely different class, viz.:

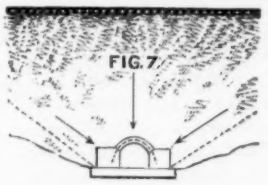
(2.) Abutments whose sole or chief function is to act as retaining walls to resist the thrust of a bank of earth behind them, tending to crowd them together or overturn them upon each other; the thrust of the arch, if any exist, being a subordinate force acting in conjunction with the resisting moment of the abutment itself to maintain stability, and not to disturb it.

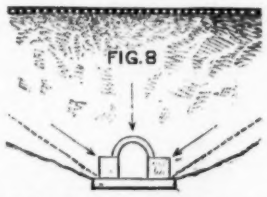
To this class belong all abutments of culverts of moderate span under high banks of earth, especially when subjected to the vibration of trains. It may be said to be, in the main, a type peculiar to railroad work, and hence comparatively modern, since on railroads only are high fills over small structures common, and vibration from passing loads an appreciable consideration.

That an increase of horizontal thrust over the merely nominal thrust of a semi-circular arch is, within certain limits, as in the cases outlined in figs. 7 and 8, a force tending even in theory, and still more in practice, to stability and not to instability, will not be questioned. Few constructing engineers have failed at some time to have or know of cases where the careless pushing of a fill against an abutment, or a sudden slide in it, has moved the latter bodily on its foundations. When the structure is completed this danger is reduced (1) by the thrust of the arch, (2) by the more perfect consolidation of the bank, (3) by the completion of the entire fill; but, on the other hand, it is or may be much increased as respects any one abutment by (1) the dead load and vibration of an approaching train, (2) an inequality in the natural stability of the earth on the two sides of the culvert, especially if increased by (3) the penetration of water either from above or below into the earth backing. What the net effect of all these varying conditions might be, from time to time, it would be profitless to consider in detail, but it would probably be impossible to approximate to the forces indicated by the arrows in figs. 7 and 8 more nearly than to assume that they are, or at times may be, under the effects of jars and water, equal to each other; or, in other words, that any one of the three may be, at any given moment, larger than the others. The theoretical form for an arch of equal strength, to resist normal pressures of equal magnitude, is a circle, but it must be a circle normal to *all* the lines of pressure. We approach this condition most nearly, it is clear, by the segmental form shown in fig. 8, in which we may consider the abutment merely as a substitute for the lower portion of the arch. We reach the same end less perfectly in fig. 7, even if we assume the abutments to be in themselves so firm and unyielding as to need no extraneous support, which cannot be done, obviously, without making them more massive than when they have such support from the arch.

That the chief strain to which culvert abutments under fills are subjected, and which fixes their thickness, is the thrust from the earth backing, and not from the arch, becomes evident in another way, if we consider the arch to be loaded with its full load, but to have no backing of earth whatever behind the abutments. The customary proportions for abutments of small spans will be at once seen to be greater than is required for transmitting any strain arising from the arch, and it will also be seen that the effect of any *moderate* pressure from earth backing, well within the horizontal thrust of the arch, would be to increase and not diminish its stability, it being only because the earth pressure is materially the greater that such thick abutments are necessary.

It is perhaps because the details of minor structures receive so little attention in some text-books that these obvious differences between the theory of a 6-ft. arch under a fill and a 60-ft. arch carrying a road-bed have not been pointed out (if the impression is correct that they have not been) in text-books on engineering, especially the more recent ones, which recognize that the *facts* of practice in small structures do not correspond with the general theory of the arch. Some of the text-books do not even pretend to go





much into details of minor structures, but even Mr. Trautwine, who thought no detail too small for him, and who discussed the question of arches in general so well, does not seem to have had in mind this essential difference of conditions, and his single general formula for two distinct classes of abutments, consequently, while approximating remarkably close to safe practice for all spans and kinds of arches (as witness that it gives the abutments of a segmental arch slightly thinner than for a semi-circular arch, as we have seen they may be), yet falls short in certain inconsistencies, noticeably in giving somewhat lighter abutments for small structures than average practice approves. Moreover, although his formula is, of course, correct, according to the reasoning here followed, in giving to *small* semi-circular arches thicker abutments than if segmental, yet in the case of an arch of 100 ft. span, in which any pressure from earth backing sinks into insignificance compared with the thrust of the arch, it can hardly be right that the thickness of the abutment on top should be, with the semi-circular, 17 ft., and with a segmental of 120 degrees, only 16.45 ft.; the total volume of masonry for an abutment 25 ft. high being practically identical for both. This discrepancy is not commented on as in itself serious, but simply as showing that no single formula can be made (or at least has not yet been made) which shall be good both for the thickness of an abutment and for the thickness of a retaining wall.

The New York Railroad Commissioners' Recommendations.

In commenting upon their report last week, we were able only to allude very briefly to that part of it which recommends that roads be required to put low railings along the edges of freight car roofs, as a means of saving brakemen who may slip or fall. As we have said before, we think that definite legislation of this kind, prescribing special devices, is mischievous and impolitic; it would only be justifiable at all when it was very certain that the best mode of accomplishing the desired result had been determined; and in this matter we feel very sure that the recommendation of the commissioners is not the best that could have been made.

For it is more than doubtful whether such a railing as the commissioners recommend would practically be of benefit, if it were applied to all cars; when it has been discussed by practical men, there have been perhaps as many opinions adverse to its adoption as in favor of it. There are many who would prefer a railing along one side of the running board of the car—as calculated to *prevent* the brakemen from falling or sliding, instead of catching him after he has fallen. A very large part of the cars which traverse the state of New York are owned in other states, and are subject to other legislatures, which may adopt the view that the central railing is the most desirable, or that either railing would be objectionable. This diversity of opinion among legislatures, when they begin to direct as to details, is illustrated by the legislation in different states as to the appliances to be carried upon passenger trains, as a precaution against the imprisonment of passengers by accident. One state specifies a sledge and fire buckets; another a saw and axes, and so on.

Another recommendation of the Commissioners upon which we wish to comment accompanies their report upon an accident which occurred on the Rochester & Pittsburgh Railroad on Nov. 17, 1884, of which we printed the substance last week. A train of 38 cars, manned by three brakemen and a conductor, broke in two, leaving seven cars in the rear section with three men on it, and only one on the forward section of 31 cars. We conclude from the report that the train broke in two because it ran too fast; that it ran too fast because brakes were not properly applied, although this is not directly stated in the report; but the Commissioners recommend that another brakeman should be employed on similar trains. It will appear to most persons acquainted with the management of trains, that one or even two of the men who were on the detached portion of seven cars ought to have been distributed along the length of the train, where they could have applied brakes enough to hold any train in check.

There is a comprehensive remedy for the evils, which the commissioners attempt to meet by their two recommendations, as well as for many other difficulties attending the running of freight trains, which appears to have escaped the attention of the board; it is the continuous brake.

If this had been in use upon the train referred to, it would not have run too fast; probably it would not have parted; if it had parted, the rear portion would have been stopped before it struck the forward section; at least one of the four men in the train crew could have been dispensed with. If the continuous brake is used, the men will not find it necessary to go upon the top of the trains, and the need of any railings would be avoided.

The continuous brake may be commended to favorable attention for another reason, which has not received from any persons the consideration which it deserves. If the brakemen are not required upon the top of the train, the cost of carrying other railroads and the great public thoroughfares which cross a railroad, over it, instead of allowing grade crossings, will be reduced at least one half, and render it quite practicable to make such over-crossings, where now they seem almost impossible because of the height to which they must be carried, to accommodate the standing trainmen on the cars.

The Earnings of Chicago Railroads and the Corn Movement.

The two great roads northwest of Chicago seem to have been doing very well this month. For the first two weeks of January they have had the following earnings for five years:

	1881.	1882.	1883.	1884.	1885.
Chic. & N. W.	$547,291	$735,649	$616,500	$593,000	$683,900
Chic., Mil & St. P.	475,016	660,000	650,696	653,732	608,000

It is necessary to go back some years to get a sufficient view of the course of earnings, because last year and also the year before, the earnings were unfavorable on many roads. These roads had an important increase in mileage every year until this year, and the same total earnings now make much smaller earnings per mile than in 1882 or before. Both, we see, earned more this year than last, the Northwestern 15⅓ per cent. more; but the Northwestern earned considerably less and the Milwaukee & St. Paul only a trifle more than in 1882, with the smaller mileage. On both these roads the corn crop is immensely greater than last year—perhaps twice as great, and as the corn has now been ripe some months, we might suppose that their earnings are greatly increased by the shipments of corn and hogs, which in the aggregate are much larger than last year. This is a traffic which the St. Paul has not heretofore had a great deal of; but it has now a large mileage in the corn country of Iowa, and though it has had it more than one year, it has not had much of it at any time when there was a large corn crop. The Chicago & Northwestern has always had a large mileage in corn country, but it has greatly increased that mileage (especially in the northwestern part of Iowa) since the last good crop, which was in 1880.

But it is probable that the corn movement over these roads, though perhaps much greater than last year, is still small. Corn does not usually go forward freely (unless prices are high) from the country so far north until much later. The Iowa farmers are much more likely to market their corn in June than in January. The record of the receipts at Chicago by the different roads in successive months shows this. The last year in which there was a heavy corn movement was 1881, but then the winter movement was greatly reduced by blockades of the railroads, and a fairer example is 1880, when the receipts *in successive months* by the Chicago & Northwestern, the Chicago, Burlington & Quincy, and by all routes were:

	By C. & N. W.	By C., B. & Q.	Total.
January	325,357	2,713,930	4,501,777
February	437,405	1,659,350	3,754,232
March	1,174,265	2,439,040	6,189,180
April	383,205	2,308,100	3,578,137
May	2,228,149	3,679,800	11,142,763
June	2,837,859	5,103,500	11,821,819
July	2,027,504	4,867,600	11,972,448
August	1,834,683	5,139,400	12,434,257
September	1,461,450	4,856,300	11,735,956
October	1,128,070	3,950,269	10,555,204
November	525,280	1,794,172	5,068,766
December	521,400	2,408,502	4,518,305
Total	14,884,629	40,919,963	97,272,844

We see here that the Northwestern in 1880, then the

northernmost road carrying any considerable amount of corn to Chicago, brought very little there in any winter month, and a much smaller share in the winter months than later. Thus, while 4.64 per cent. of the total Chicago receipts arrived in January, and 6.63 per cent. of the Burlington receipts were in that month, only 2.19 per cent. of the Northwestern's receipts came then. Not 7¼ per cent. of the Chicago receipts arrived by the Northwestern in January, and not 12 per cent. in February, but in May it brought 20 per cent. and in June 24 per cent. of the whole.

A difference between this year and 1880 is that then there was a full supply from a fair crop in 1878, so that there was no urgent demand to hasten shipments as soon as the grain was in condition. This year the stocks were very low when the new crop ripened, and the total winter movement is likely to be larger than in 1880. But the southern districts, where the grain ripened first, were able to take advantage of this, and now we know that the demand is not great enough to make the price high, or to prevent its being very low.

The roads south of the Northwestern are likely to carry more corn than it *in the winter*, though taking the year through it will doubtless rank next to the Burlington as a corn carrier hereafter. In 1880 and 1881, when its mileage was much less than now, it carried less than the Rock Island, and in the winter months not half as much.

We may not, therefore, expect now much increase in earnings on the Northwestern and the St. Paul on account of corn shipments for some time, but a large one after navigation opens in the spring. But a considerable increase should be made by the large hog movement, which is at its height in the winter. The Chicago, Burlington & Quincy, on the other hand, may have a substantial increase of its earnings by a larger corn movement in the winter, though the *gain* will not be so great as if it carried from this side of the Missouri exclusively, because last year also there were large crops in Kansas and Nebraska, and high prices to encourage their shipment.

The Pennsylvania Railroad last week reduced the emigrant rate from New York to Chicago, St. Louis and Cincinnati to $1, the regular rate to Chicago being $13. This step has attracted much attention. It is, however, a less serious matter at this season of the year than at any other season, and this year than in any recent year; for the immigration is always light in the winter, and it has been and is going to be for some time much lighter than heretofore, because there is much less than the usual demand for labor, and people come here in great numbers only when it is easy to get work at good wages.

The total immigration for five years has been:

1880.	1881.	1882.	1883.	1884.
586,068	716,863	712,543	560,196	453,983

But the decrease for the year of 19 per cent. from 1883 and 36 per cent. from 1882 does not show the extent to which immigration has fallen off, because the larger part of the decrease was in the latter part of last year, for in the last quarter of 1884 the arrivals were 30 per cent. less than in 1883 and 51 per cent. less than 1881. And in December the decrease was still greater, the arrivals having been:

1881.	1882.	1883.	1884.
37,037	25,868	23,760	13,622

During the season, and when immigration is large, the immigrant traffic is very important to the trunk lines, as a very large share of the arrivals are carried west over them—much the greater part of the whole number, probably. Half of the 141,035 arriving in May, 1882, would have given at the regular rate of $13 from New York to Chicago about $420,000 to the lines east of Pittsburgh and Buffalo, and the carriage for a dollar of the 700,000 and more that arrived in 1881 and 1882 would have caused a net loss of some millions of dollars. But until April probably not more than ten or fifteen thousand a month will arrive, and not all of these at Castle Garden, and of these only part will go west, and the carriage of them at less than cost is not going to be so serious a matter. Probably long before the immigration begins to be large the rate will be restored. This is the best time of year for making a cut in this business, because least will be lost by it now. As for the causes of the action of the Pennsylvania, it probably thought that it had been imposed upon. It is credited with having maintained its agreements with the other companies more faithfully than any one else, and it perhaps felt that the other companies were counting on its forbearance, and doing what otherwise they would not venture to do. As a rule, railroads (and other interests) get all the advantages for themselves they can, restrained only by their apprehensions of what future injury their acts may bring upon themselves. If one competitor is less likely than another to resent impositions, that competitor will be imposed upon more than others. People take advantage of its peaceful disposition. So long as contests are permitted at all, every party needs to have it known that it is able and willing to fight and to fight hard, and that it will not endure any imposition. The railroads have made some steps toward their transfer from militancy to industrialism, as the evolution philosophy has it, but they have not yet attained the condition which will permit them to give up fighting entirely and depend upon the laws of the land or the rules of conduct agreed upon among themselves. They have perhaps ceased to wear swords as an ordinary part of their costume, but they still need to have weapons within reach, and a great many still carry pistols in their hip pockets or bowie knives in their boots, and some have the reputation of being "very handy with their weapons." The Pennsylvania has not been handy with its weapons, and therefore when it begins to flourish a long, sharp knife, people stare.

We said last week that there was danger of the suspension of the east-bound freight pool. What has happened is not that exactly, but what may be called a suspension of the pool rates. The meeting of trunk line presidents last week authorized the various companies to meet any cut rates. Apparently everybody is surprised to find that the changes in rates have been so small. At Chicago the 25-cent rate on grain was immediately reduced to 22, presumably to meet cuts at Milwaukee and elsewhere, and on Monday there was a further reduction to 20 cents, which seems to be firmly maintained. Moreover, the different roads, instead of rejoicing at their freedom and hitting a head whenever they see one, are said to be consulting with each other, the rates at the several pooling points being made by the joint action of the roads, these acting through their regular committees and aiming to make no greater reduction than is required by rates made from other places. Indeed, there seems to be a general disposition to avoid carrying for less than cost. There is a close approach to it, but on most of the roads a 20-cent rate will probably pay expenses, and on some of them leave a little margin of profit—possibly as much as 5 cents per 100 lbs. on the line which is cheapest to work. But on the best of them the profit at a 20-cent. rate cannot be more than half as great as at the regular 25-cent rate; and on some perhaps but one-third or one-fourth. The cents that are taken off come from the few cents of net profit and not from the many of working expenses.

We have this week reports of December earnings from 26 railroads, besides those given previously. These also make, in the aggregate, a favorable showing, compared with previous months, and their total earnings are even a trifle more than in December of 1883. Of the 26 roads, 14 had some increase in earnings, and the decreases were mostly small, the largest being 12.8 per cent. on the Ohio & Mississippi, 19.3 on the Forth Worth & Denver, and 26 on the Gulf, Colorado & Santa Fé.

No less than 16 of the 26 roads are Southern railroads, and nine of them show gains. Three of these are new roads, which had only begun to make earnings last year. But the gains of 35 per cent. by the Alabama Great Southern, 25¾ by the Columbia & Greenville, and 9½ by the Richmond & Danville indicate a decided increase in traffic.

Most of the roads reporting this week are small ones, but there are two very large ones—the Wabash and the Atchison, Topeka & Santa Fé. The Wabash reports a decrease of 4½ per cent., compared with 1883, but larger earnings than in any previous year. For the five years they have been in December:

1880.	1881.	1882.	1883.	1884.
$1,050,816	$1,294,657	$1,341,952	$1,518,288	$1,448,383

There has been no increase of mileage since 1882, and but little since 1881. The increase over 1882 is nearly 9 per cent.

The Atchison's decrease is 2.3 per cent. The decrease from 1882 and 1881 is much greater. Without the Southern Kansas, it earned $176,000 (13.7 per cent.) more than last December in both these years.

More than half the aggregate earnings of 26 roads reporting this week were by these two roads.

Among other Northern roads that report this week, the Denver, Rio Grande & Western has an increase of 43½ per cent., but this is not because of large earnings last December, but because of small ones the year before, the earnings per mile having been $184 in 1883 and $265 in 1884; and the Wisconsin Central, which has had decreases most of the months of late, had a gain of 8½ per cent.

We have now had reports from 68 railroads for December, showing the following aggregate:

	1884.	1883.	Decrease.	P.c.
Earnings	$22,759,994	$22,804,605	$44,611	0.2

This is a very small change, and is favorable because for several months previous there had been considerable decreases.

The complete report of the through rail shipments eastward from Chicago in December, including all the freight pooled (but not live stock and dressed beef), shows them to have been 283,400 tons. There has been included this year for the first time the freight transferred from Western to Eastern roads at junction points outside of Chicago, the principal being Joliet, Englewood and Matteson.

Before this was pooled it was ascertained that it formed about 9 per cent. of the total shipments, and in order to make a fair comparison with previous years we deduct 9 per cent. from the reported shipments of last December, and find as the shipments of the month for the last six years:

1879.	1880.	1881.	1882.	1883.	1884.
179,154	244,790	259,326	280,151	202,689	257,894

Thus the shipments last December were 27½ per cent. more than in 1883, but 8 per cent. less than in 1882, a little less than in 1881, and but 5½ per cent. more than in 1880. The regular rate this year was 25 cents for grain, with some cutting; last year the rate was 30 cents, tolerably well maintained; in 1882 it was 30 cents, well maintained; in 1881, about 12½ cents; in 1880, 35 cents, and in 1879, 40 cents. In 1879 the traffic was divided among five railroads; in 1880 six shared it; and in 1883 and this year, eight. The six roads which carried 280,000 tons in 1882 had about 212,000 tons this year. The earnings from their business in 1882 were about $500,000 more than in 1884; in 1880, $550,000 more.

From the year 1884 the total Chicago shipments were 2,835,364 tons. Deducting 9 per cent. for the junction points, we compare with the previous years as follows:

1879.	1880.	1881.	1882.	1883.	1884.
2,471,738	2,309,640	2,889,317	2,129,989	2,401,488	2,580,181

Thus the shipments last year were larger than in any other year except 1881, the year of railroad war, yet only 7½ per cent. more than in 1883, and 4½ per cent. more than in 1879, and but 11½ per cent. more than in 1880, when rates were well maintained at 30 35 and 40 cents.

That last year's shipments were so large was due to the 15-cent rate during April, May and June. In April and May the shipments were larger than in any other month, though the opening of navigation usually makes them small in these months. For these three months (deducting 9 per cent. from junction points in 1884) the shipments were:

1879.	1880.	1881.	1882.	1883.	1884.
838,631	535,677	989,312	370,049	446,007	888,987

Only in 1879 was there a traffic in these months at all comparable to that of last year, and then the conditions were similar—the railroads were carrying for less than cost. The natural conditions were not so favorable for traffic at this time in 1884 as in 1883, and it is probable that the low rate increased the rail shipments fully 400,000 tons, and that but for it the year's shipments would have been nearly or quite as small as in 1882, and much less than in any other year since 1878. When the new roads betweeen the East and the West were being constructed, we were assured that the traffic would grow so fast that the new ones would be well supported without reducing the business of the old ones. Actually, we see that it has scarcely grown at all since 1879, while there are now eight roads carrying it instead of five.

A proposition to incorporate the "short haul" clause of the Reagan bill in a bill pending before the Senate was defeated by something like a three-fourths vote. Judging from some of the discussion, however, the Senators are not better informed than the members of the other House on the subject concerning which they propose to legislate, but are only somewhat more cautious, and feel the responsibility of making laws that may have an important effect on great public and private interests. The Senate bill provides for a commission, which is to be permanent and is prescribed certain regular duties, but the first year will have in addition the special duty of investigating generally the question of inter-state transportation. It is extremely desirable that there should be such an investigation by persons of capacity, some knowledge of economic principles and the conditions of doing business, who will devote their whole time to the work, and ascertain definitely what are the specific evils existing in the conduct of inter-state transportation, how great and how common they are, and especially whether they can be cured by any general remedy or remedies;

34th St. YARD. N.Y.C & H.R.R.R.

N.Y.W.S. & B.Ry.

P.R.R.

Scott & Co.

35 ST

AV. 12

Hay

Fresh Meat

MANHATTAN MARKET.

Potatoes

34

ST.

AV. 11

To 60th Yards 2 Miles

Elevator.

SLIP.

Hay Shed

Mill.

Transfer Bridges.

Hay Store House

Uncovered Pier.

Derrick

SLIP.

SHED.

SCALES

BULK FREIGHT

Derrick

SLIP

EAST BOUND FREIGHT SHED

SHED.

Platform

WEST BOUND SHED.

Office

DUMMY HOUSE.

N

W E

50 100 200 300 400 Ft.

COAL DOCK

71 ST.

70 ST.

69 ST.

68 ST.

67

MAIN TRACKS

TRACKS LEADING TO RECEIVING CARROON

Foot of Steepest Grade

COAL POCKETS

OIL & COAL YARD &c.
1 Mile.

East Bound Yard
10 Miles.

EMPTY YARD.
3 Miles

ROUND HOUSE

High Trestle Track

COAL WHARF

Oil Track

Steam Derrick

SHED FOR WEST BOUND FREIGHT.

SLIP.

SHED.

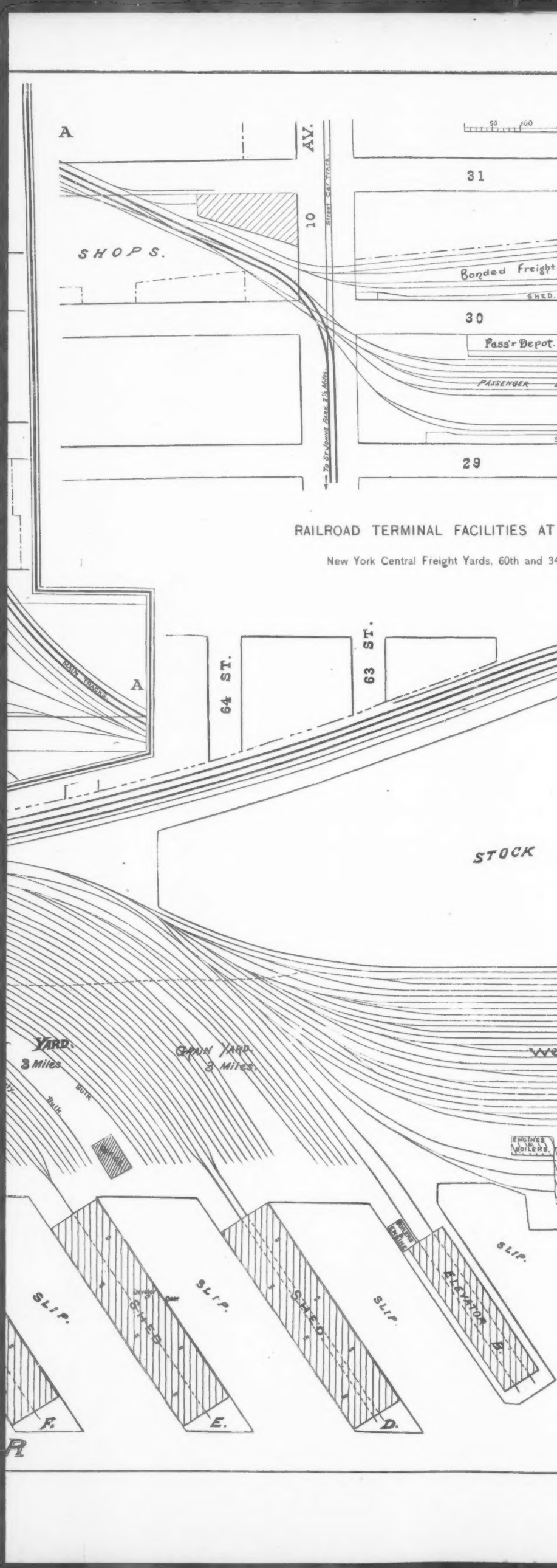
SLIP.

G.

F.

50 0 100 200 300 400 500 Ft.

HUDSON RIVER


A
AV.
10
Street Car Track
SHOPS.
31
Bonded Freight
SHED.
30
Pass'r Depot.
PASSENGER
29
← To St. Vincent Ferry, 2½ Miles.
50
100
RAILROAD TERMINAL FACILITIES AT
New York Central Freight Yards, 60th and 3
64 ST.
63 ST.
MAIN TRACKS
A
STOCK
YARD.
3 Miles
GRAIN YARD.
3 Miles.
Bulk.
Bulk.
ENGINES & BOILERS.
SLIP.
SLIP.
SLIP
SLIP.
SHED
SHED
ELEVATOR B.
F.
E.
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R

50 100 200 300 400 Ft.

1 ST.

AV.

ded Freight

SHED.

9

0 ST.

Pass'r Depot.

PASSENGER EMIGRANT.

SHED.

ST.

LITIES AT NEW YORK.

ds, 60th and 34th Streets.

TOCK YARDS

ST.

60

ABATTOIR.

ST.

59

STORE HOUSE.

West Bound Yard
5 Miles

ENGINES & BOILERS.

ELEVATOR A.

SLIP.

PIER C.

or whether each case does not have to be considered by itself by a special tribunal, applying specific remedies for specific cases.

There is a report that Mr. Vanderbilt has sold his interest in the South Pennsylvania Railroad to the Pennsylvania Railroad. The report has been contradicted, or rather the reason given for the sale—unexpectedly high cost of constructing the road—is denied. Pittsburgh men interested say that it is costing no more than was expected, that work on the tunnels is being prosecuted, and that the road will be completed by the middle of next year. Yet it seems reasonable enough that such a transfer should be made. The road, if built, ought to be worth more to the Pennsylvania than to any one else, unless perhaps to the Reading, and the profit it might bring to the Reading would go to the bondholders, and probably not at all to the stockholders; while certainly the Reading is not in position to contribute any aid. Moreover, the Vanderbilt interest must now have a realizing sense of the disastrous effect of the multiplication of trunk lines. It bought the Nickel Plate, and then had to take from its old lines nearly all the business it gets. It would not be pleasant to have to take another slice of business from the New York Central to give to the South Pennsylvania, yet this probably would have to be done if the South Pennsylvania were to get any through traffic, and probably more from the New York Central than from any other road—even the Pennsylvania—because the only feeders of the South Pennsylvania west of Pittsburgh would be the western Vanderbilt roads. Doubtless a very considerable traffic to and from Pittsburgh and the coke regions might be diverted from the Pennsylvania, but this is not a through traffic. If this and the other local business will support the road, the Pennsylvania can make more out of it than any one else; and if it were to take its time to complete it, it could utilize successive sections as fast as they were completed by connecting them with its branches from the north, which the independent company could not do.

If the Reading were in position to help largely in constructing this road, there would be a reason for completing it, and for the Vanderbilt interest to assist in completing it, that does not otherwise exist. The Reading, if financially sound, might even extend its line to Pittsburgh on its own account. It has more than 200 miles of line between New York and Pittsburgh, and a vast network of roads which must have a great deal of traffic to interchange with the West. The Vanderbilt lines from Lake Erie through Pittsburgh to the Connellsville coke region afford a considerable part of a line east of Pittsburgh, and an outlet to the West for the whole line, and *if a new line is to be built*, it is better for them to get the traffic than to leave it to a competitor or to have a new line made to carry it. But, as by far the larger part of the benefit of such a line (if there should be any) would necessarily go to the Reading, it will be great good luck for that company—or rather for its bondholders—if some one else builds the road for it.

There has been a good deal of complaint by bondholders of the Houston & Texas Central Company directed toward Mr. C. P. Huntington, who represents a controlling share interest as President of the Southern Development Company. This company, that is the holder of a majority of the shares, bought the first-mortgage coupons due this month. Mr. Huntington has written a letter, in which he explains how he came to have any connection with the Houston & Texas Central; it was by purchasing the late Charles Morgan's interest in the Morgan's Louisiana & Texas Railroad. The latter railroad Mr. Huntington wanted for the New Orleans and of his Southern Pacific line. The Houston road forms no part of this line, and only touches it at Houston; but the Morgan company owned most of the stock, so that the control of it meant the control of the other. The control was obtained in the spring of 1883. Mr. Huntington says that the Southern Development Company was applied to for an advance of money to pay the first-mortgage coupon last July, and that but a small part of the advance then made was repaid during the next half year, and that, feeling that the road would not be able to earn its large interest charges, he determined not to make further advances on this account.

It is true that there is neither legal nor moral obligation on the part of Mr. Huntington or the Southern Development Company to pay any interest on debt of the Houston & Texas Central, but as holding the control of the company and dictating its policy and management, they are responsible for all the acts of that company since April, 1883, and the first-mortgage bondholders have a right to inquire why, when the money for their July coupon had to be borrowed and the road was not earning all its interest afterward, it was permitted to pay interest on the consolidated and general mortgage bonds last October.

It is entirely improbable, and is not pretended, that the net earnings of this company have been less than the interest of the first-mortgage bonds, and when the company failed to pay the bondholders interest it should in decency have given them a statement of its accounts, showing just what its net earnings had been. The absence of this knowledge makes it impossible to estimate the value of their bonds. For this it is necessary to know by *how much* the net earnings were. Lacking this information, investors may be led to sacrifice their bonds for much less than they are worth.

Since the above was written a statement of the earnings and expenses for 1884 and 1883 has been given to the bondholders' committee, in which not only is a deficit shown for 1884, but also for 1883, and the expenses reported for 1883 are given as $2,588,957, while by the statement published heretofore, and given in Poor's Manual, the expenses that year were $1,743,770!

The Houston & Texas Central.

When holders of the coupons due Jan. 1 of the Houston & Texas Central Railway Company presented them for payment, they were informed that the company would not pay them, but that the Southern Development Company would buy them. This, of course, was a default of the railroad company. The first-mortgage bonds, which just before had sold for about 110 with the coupon, declined rapidly to 90 and below, and the second-mortgage bonds fell from 111 to 79; when last week the great banking house of John J. Cisco & Son suspended, the great decline of the bonds of this company, of which they were said to hold half a million, was given as one of the causes of their failure.

The Houston & Texas Central is one of the oldest Texas railroads, and in many respects the best placed, occupying the most fertile and populous section, and having very little waste land on it—no great expanse of woods too poor for timber, or plains fit only for grazing, as on most of the larger Texas railroads. For a long time it had the state pretty much to itself, and in those days formed the only possible outlet for the country in its vicinity, at first carrying everything southward to Houston, on the way to Galveston, and afterward carrying it also northward, in which direction the Missouri, Kansas & Texas had given it an outlet. Until that date the railroad system of Texas was entirely isolated from the rest of the world.

The first road to be built near enough to affect this road much was the Houston & Great Northern, now part of the International & Great Northern. It was parallel on the east, but too far in the woods for much of its length to develop a large traffic or to divert much from the Houston & Texas Central. The International Railroad crossed it diagonally, however, and so divided north-bound traffic from a certain territory. Then came the Texas Pacific, and of late years the lines built by the Missouri, Kansas & Texas in North Texas; then the Gulf, Colorado & Santa Fe, which is a parallel line on the west as the Great Northern is on the east, and, though quite distant, is in a fertile country and in position to arrest a certain traffic which used to come from the west to the Houston & Texas Central. It is generally as much as 25 miles distant, but it strikes a branch in two places with the main line and a branch. Finally the Texas & St. Louis crossed it where there is a fine cotton country.

But, notwithstanding the great number of railroads that have been built in what was formerly the territory of the Houston & Texas Central, it still has a large and fertile territory between it and the nearest lines. Only about Houston, Waco and Dallas can the territory be said to be badly divided up. The multiplication of outlets to Texas has been of advantage to it. It can now carry for St. Louis and the North, for New Orleans and the extreme South, and for Vicksburg, where formerly it could carry only for Galveston.

After 1873 it had some dark days. An attempt was made at one time to put it into a receiver's hands in the interest of floating-debt owners; but this was frustrated, and the late Charles Morgan secured a majority of the stock and provided for the debts. In 1875, we believe it was, the company did not pay a first-mortgage coupon, but it was bought by Mr. Morgan just as the Southern Development Co. is buying them now. The second-mortgage coupons have always been promptly paid.

The company has never published regular annual reports, and it has not been possible to ascertain precisely its financial condition. Some years ago the road was in frightful condition, but it has been very greatly improved since. Last year it suffered greatly from floods, as it has before at times.

The first year that the road was opened through to the Red River, 1873, it reported $3,286,818 gross earnings and $1,314,727 net from 508 miles of road—$6,470 gross and $2,588 net per mile. The interest on the bonds then outstanding was $914,000, so that there appeared to be a large profit left for the stock. No balance sheet or other financial statement was given, however, and there was probably a large floating debt at that time.

The next statement of earnings that we find is for the year ending with April, 1876. They were very nearly the same then as in 1873. The funded debt was substantially unchanged, and the capital stock was but $800,000. A statement made for the calendar year 1876 showed $1,277,321 of net earnings.

For the year ending with April, 1879, the gross earnings were $3,031,632 and the net $1,326,906, but then the funded debt had increased to $14,586,500, with $1,058,315 of yearly interest. A balance sheet was published then, showing $7,722,900 of capital stock, and also showing $2,106,558 of bills payable, and $992,000 of other unfunded debt.

A statement for Dec. 31, 1883, showed the gross earnings nearly the same as in 1873, when the road was opened, namely, $3,254,876, or $6,233 per mile of road; but the net earnings had increased to $1,508,105, or $3,103 per mile. The funded debt had increased to $16,874,500, and the interest on it to $1,193,200, which is $314,905 less than the net earnings reported. But interest and sinking fund on small state loan and interest on the floating debt made the total interest payments $1,296,292. For every dollar of this interest there was $1.16 of net earnings, and for every dollar of *first-mortgage* interest ($677,040) there was $2.09 of net earnings. That one year from this time, having meanwhile paid the interest on its second and general mortgage bonds, the company should fail to pay the first-mortgage coupon may well have caused astonishment. The balance-sheet at the close of 1883 showed the large sum of $2,672,291 of bills payable, which may have been a heavy load to carry.

For five years the net earnings and interest payments reported have been:

Year.	Net earnings.	Interest.	Unfunded debt.
1879	$1,326,906	$1,058,315	$3,089,096
1880	1,734,677	1,120,000	2,452,873
1881	1,606,782	1,203,679	1,835,429
1882	1,467,613	1,247,114	2,594,166
1883	1,508,105	1,296,292	3,043,450
Total	$7,583,084	$5,935,400	

The first of these years ended with April; the others with December. The interest on floating debt is included in the last four years, but not in the first two, not being reported then. It appears that in these five years the net earnings have exceeded the interest payments about 28 per cent., the amount of excess having been $1,648,000. It appears also that the unfunded debt increased $1,200,000 from 1881 to 1883. From 1880 to 1883 the construction account increased about $2,500,000, the cash, bills and accounts payable by $586,000.

There was plenty of room for spending money on the road, but there is nothing here to show why the company should lack earnings in 1884 to pay any interest, not to say first mortgage interest, nor why it should not hereafter, if no disaster happens, be able to meet all its interest charges.

The Houston & Texas Central owns 521¾ miles of railroads, consisting of 345 miles of main line from Houston northwest and north to the northern border of the state, a branch from Hempstead (51 miles northwest of Houston) westward to Austin, 118¾ miles; and a branch from Dremond (143 miles from Houston) northwest 58 miles through Waco to Ross.

The latter division is extended further westward 176 miles by the *Texas Central Railway*, and another line (not connecting with this) is owned by the same company extending from the Houston & Texas Central main line at Garrett (234 miles from Houston) northwestward 52 miles. These properties of the Texas Central Company are worked by the Houston & Texas Central, but on what terms is not stated. Their earnings are not included, but have been stated separately. The average miles worked, gross and net earnings and interest on bonds for the first three years of their operation, were:

Year.	Miles.	Gross earn.	Net earn.	Interest.
1881	143½	$247,707	$128,677	$183,750
1882	180	269,543	121,679	279,900
1883	228½	290,331	102,545	279,930

Thus the road's net earnings have not been half as great as its interest charges, which have been met, however. It must have an extraordinarily light traffic, as its gross earnings in 1883 were but $1,270 and its net earnings $450 per mile. So far as known, the Houston & Texas Central has incurred no obligations on acount of the Texas Central, but then very little is known. The two companies have the same officers.

There are six mortgages on the Houston & Texas Central. The first-mortgage main line is secured on the 345 miles from Houston to Sherman, and is at the rate of $18,150 per mile, requiring but about $1,270 net per mile to satisfy it. It is hardly possible that the main line should not make as much as double this. The first-mortgage bonds on the Austin line (Western Division) are at the rate of $19,200 per mile. It is said not to have a very good traffic, but it runs through a good country. The firsts on the Waco line are $20,000 per mile. It is in the best country on the road, but lacks a through traffic, except the trifle the Texas Central brings it, and has too many near neighbors to be comfortable.

A consolidated 8 per cent. bond is secured by the main line and the Western Division, and also by three fifths of the company's land grant of 5,240,000 acres, which ought to be valuable, as this company had the first opportunity to select. They are not on the line of the road, however. There is nothing to show what sales, if any, have been made. About $9,000 per mile of these bonds are outstanding. They run till 1912. (The main line and Western Division firsts till 1891, and the Waco firsts till 1903.) An 8 per cent. consolidated bond on the Waco line has been nearly all retired.

A "general" mortgage was authorized in 1877 to retire some floating debt and eventually the other bonds; $3,000,000 of the bonds under it had been issued at the end of 1883. They bear 6 per cent. interest and run till 1921. They were issued after the others, and must be subordinate to them.

Taking the whole funded debt together, it is at the rate of $32,324 per mile, and the interest on it is $2,290 per mile.

It seems to be assumed that the Southern Development Company, which has purchased the coupons from bondholders willing to sell them, has done so with the intention of foreclosing and forcing a reorganization with lower rates of interest on the bonds. This involves some legal questions. The first-mortgage bonds, at least, are abundantly secured, and it is hard to see how anything can be done to take away their security.

No report of the earnings of the road in 1884 has been made, but the company's officers have said that the net earnings were not enough to pay the interest on the bonds. The year was not a favorable one. The failure of the cotton crop in 1883, however, did not prevent good earnings on other Texas railroads during the first part of 1884. The second failure in 1884 probably has reduced earnings greatly for several months, as other Texas roads indicate. There were no new railroad competitors in the territory of the Houston & Texas Central in 1884, but one of them, the Texas & St. Louis, probably increased its business then considerably.

Chicago Shipments.

Chicago through rail shipments eastward, for the week ending Jan. 17 last and for corresponding weeks of five previous years, have been, in tons:

1880.	1881.	1882.	1883.	1884.	1885.
31,171	50,587	70,724	66,034	48,394	67,053

Thus the shipments this year were larger than in any other year except in 1882 (when the prevailing rate was probably 10 cents) and 38 per cent. more than last year.

For the five weeks that the through shipments have been reported, they have been:

	Week ending				
Tons:	Dec. 20.	Dec. 27.	Jan. 3.	Jan. 10.	Jan. 17.
Flour	11,861	8,122	9,394	11,836	10,905
Grain	26,845	16,938	19,362	29,772	42,977
Provisions	14,326	9,324	10,648	13,003	13,171
Total	53,032	34,384	39,404	54,611	67,053
Per cent.:					
C. & Grand T.	20.2	15.5	20.4	19.3	15.8
Mich. Cen.	24.3	22.5	20.0	24.3	29.0
Lake Shore	11.6	11.7	14.5	9.0	12.3
Nickel Plate	9.2	17.2	11.5	13.3	8.3
Ft. Wayne	14.4	13.4	15.0	14.9	7.7
C. St. L. & P.	7.2	6.0	6.3	6.1	8.4
Balt. & Ohio	7.4	9.2	7.2	7.6	6.3
Ch. & Atlantic	5.7	4.0	5.1	5.5	12.2
Total	100.0	100.0	100.0	100.0	100.0

Thus the gain last week over the previous week was substantially all in grain, the shipments of which were enormous. The total was 23 per cent. more than the week before, and the largest of the winter. The rates are reported not to have been much below the regular 25-cent rate, the cuts prevailing (or complained of) then being at other places; and the decision of the Trunk Line Executive Committee on Friday of that week to leave all free to make rates to suit themselves not having been made in time to affect more than one day's shipments. It is probable, however, that the shipments, if not from Chicago at least from points which ship through Chicago, were largely increased by cuts in rates, as, when there are such cuts anywhere, it is very improbable that there should be any great increase in such shipments as are made at regular rates.

The changes in percentages last week were considerable. The Chicago & Grand Trunk carried a much smaller share than usual of late, while the reductions were even greater on the Nickel Plate and the Fort Wayne, the latter explained by the strike at Fort Wayne. The Michigan Central, the Lake Shore and the Chicago & Atlantic made large gains, and took larger shares than in any other week of the five. The three Vanderbilt roads together carried 49.6 per cent of the whole, in spite of the decrease of the Nickel Plate. This is a larger share than they have had in any other week except that ending Dec. 27, when the whole shipments were only about half as great as last week. The Chicago & Grand Trunk carried more provisions than any other road—21½ per cent. of the whole, the Michigan Central following with 19½ per cent. The Michigan Central carried nearly one-third of the grain and more than twice as much as any other road, the Chicago & Atlantic, which stood next, taking less than 15 per cent.

So far, great reductions in the rates from Chicago have not been reported, the first being from 25 to 22 cents, while Monday last a 20-cent rate seems to have been made on grain. This indicates that the cuts at other places had not been more than 3 cents. Whether a 20-cent rate can be maintained without any combination will depend much upon the amount of traffic offered. If there is a gain over last week's shipments probably no great exertion will be made to get traffic. If rates fall below 20 cents, however, some of the roads with a good local traffic may abandon this business to their competitors, as at this season there will probably be no profit in it. Under the circumstances, some of the roads are likely to struggle for a large share of the business, even if there is no profit on it, because they wish to demonstrate that they can command it. The Chicago & Grand Trunk is likely to make special exertions to secure shipments destined for New York city, and the Vanderbilt roads to prevent its increasing its proportion of this business. Perhaps the other roads also will act with the Vandberilt roads in this; but if it is going to cost money, they may conclude to let the Vanderbilt roads do the heavy fighting, satisfied if the Chicago & Grand Trunk fails to secure the larger share which it claims. A reduction in the east-bound rates, too, is likely to be as serious a matter to the West Shore as to anybody, which would then have no profitable traffic left except its 10 per cent. of the New York shipments. A large through traffic over the West Shore will not please any of the old roads, but it will displease the Vanderbilt roads most, and therefore they are likely to do most to prevent it.

Grain Exports of the United States.

The total grain and flour exports of the United States in December were 18,192,405 bushels in 1884, against 12,555,303 in 1883, an increase of 45 per cent. The flour exports were larger than in any other December except 1882, but the wheat exports, though nearly 60 per cent. more than in 1883, were less than in any other December since 1877. The corn exports were much greater than in any other December since 1880.

For the whole year the grain exports for 12 successive years have been:

Year.	Bushels.	Year.	Bushels.
1873	107,149,034	1879	270,626,597
1874	120,477,926	1880	298,436,661
1875	102,449,496	1881	225,851,919
1876	147,303,423	1882	163,150,040
1877	145,887,204	1883	180,598,489
1878	234,841,745	1884	177,171,366

Thus the exports last year were not 2 per cent. less than in 1883, and were 8½ per cent. more than in 1882, but were very much less than in any of the four years from 1878 to 1881. At the end of November the exports were nine millions less than in 1883, but two-thirds the loss of the 11 months were made up by the gain in December.

There was an increase last year in every grain except corn, but in that the decrease was nearly 29 million bushels (47 per cent.), and with the exception of 1882 the corn exports were the smallest since 1875. Since 1880 the decrease in wheat and flour has been 56,820,000 bushels (39 per cent.) and in corn 82,700,000 bushels (72 per cent.). The large crops of last year give promise that there will be a gain in 1885 over any year since 1881, and quite possibly over that year, depending much on the next harvest. The loss of 1884 was in the first half of the year, the aggregate exports in the last half being a little more than in 1883, a large gain in wheat overcoming the large loss in corn. This gain in wheat is due to the large crop, and its effect will remain in the first half of 1885, while the large corn crop will be felt throughout the current year.

The value of the year's grain exports fell off from $172,735,694 in 1883 to $145,442,621 in 1884, a decrease of 16 per cent., though the decrease in quantity was less than 2 per cent., and though the low-priced grain corn was a much smaller proportion of the exports. The average values of the year were: Flour, $5 22 in 1884 and $5.73 in 1883; wheat 92 cents in 1884 and $1.11 in 1883; corn 59⅜ in 1884 and 64½ cents in 1883. But the greatest changes are seen in the values of December exports, as follows:

	Flour.	Wheat.	Corn.
1884	$4.81	$0.80¼	$0.50
1883	5.14	1.09	0.67¼

Yet in spite of the great fall in prices the total value of grain exports was 10 per cent. more last December than in 1883.

The very large exports of wheat from the Pacific coast have a great effect now, which is not always reflected in the business of the Atlantic coast.

The Cincinnati *Price Current* has gathered statistics of hog packing in the Northwest from Nov. 1 to Jan. 7, with estimates of the number of hogs to come forward during the remainder of the season to March 1. The number packed to Jan. 7 was:

No. of hogs.	1884-85.	1883-84.	Increase.	P.c.
Packed to Jan. 7	4,105,000	3,740,000	365,000	9¾
To be packed by March 1	2,285,000	1,660,000	625,000	37¾
Whole season	6,390,000	5,400,000	990,000	18⅓

This estimate promises a very heavy movement of hogs, and probably a heavy movement of products, during the remainder of the season—a very important traffic to many railroads.

The estimated packing of 6,390,000 hogs during the season is more than the actual packing in any previous year since 1880-81, the numbers having been for 10 years:

Season:	Number.	Season:	Number.
1875-76	4,850,000	1880-81	6,920,000
1876-77	5,101,000	1881-82	5,748,000
1877-78	6,505,000	1882-83	6,132,000
1878-79	7,480,000	1883-84	5,400,000
1879-80	6,950,000	1884-85	6,390,000

The great increase from 1877 to 1879 was followed by a great decrease after 1881, easily accounted for by the light corn crops. That, after the stock of hogs had been decreased as it was by these light crops, there should be so great a recovery after the first good crop is surprising. It indicates that with another good crop we may be able to produce as much pork as in 1879 even. Of course the estimate of the packing for the remainder of the season may not be correct. Much will depend on prices. Corn is so cheap and plenty, and there is so much packing after the close of the winter season, that a fall in prices might reduce the winter's packing, though only to increase the summer packing, which of late years has not been very much less than the winter packing.

Among the packing cities, Chicago packed 13¼ per cent. more than last year, against 22 per cent. at Kansas City, 24 at St. Louis, 33 per cent. at Indianapolis, 5 per cent. at Milwaukee, and 15 per cent. at Louisville, while Cincinnati, packed 1⅜ per cent. less, and the great number of smaller packing towns packed 2 per cent. *less* than last year—24 per cent. of the whole this year, against 27 last year.

Among these less important packing towns (all of which together packed 40 per cent. less than Chicago alone), there are some of rising importance, the principal being Cedar Rapids, which down to Jan. 7 had packed 136,040, against 97,364 last year. The other Iowa towns, however, do not show the gains that might have been expected, considering the great increase in the corn crop there, and at several of them there is a decrease, the total for Iowa towns being 357,540, against 307,177 last year, a gain of 16½ per cent., nearly four-fifths of it at Cedar Rapids.

The Missouri River towns, where the business was stimulated last year as well as this by large corn crops in Kansas and Nebraska, have altogether packed 474,040 this year, against 373,000 last year—a gain of 27 per cent., chiefly at Kansas City and Omaha, the latter gaining 160 per cent., but still packing a little less than St. Joseph.

The reports of the Chicago shipments now issued at Chicago, and published in the Chicago and New York papers, have since Dec. 13 been reported as the *through* shipments. They do not include all the shipments in the pool, however. Dec. 14 to Jan. 11, the Chicago reports gave 181,431 tons of flour, grain and provisions; Dec. 15 to Jan. 11 the total pool shipments were 229,032 tons. A very small part of the excess consists of other freights, which are probably not 2 per cent. of the whole; the chief part, probably, consists of freight transferred from Western roads to the Eastern lines outside of the city at junction points, such as Joliet, Matteson, Englewood, etc., and perhaps of other transferred freight not reported. It is well to bear this in mind, for the actual shipments are in all cases larger than the reported shipments.

As bearing on the question of nut-locks, Messrs. Hoopes & Townsend, of Philadelphia, have recently published a letter, in which they claim to have demonstrated, by tests on several roads, that with carefully cut bolts and nuts, fitted accurately to each other by the machinery which they have perfected for that purpose, no lock whatever is needed to keep the nut in place; adding, "we find some are inclined to doubt our statement that nut-locks are not essential, but the longer our experience the more we are convinced that we are fully justified in our assertions that no nut-locks are needed to keep nuts in place on the track bolts that we cut to our gauges."

These bolts cost about 1½ cents more per joint than ordinary bolts, which is cheaper than nut locks, if the same degree of security is afforded. A very large mileage of railroads throughout the world has no nut-locks, but whether the bolts are kept tight by their better construction or by more constant attention of the trackmen, does not appear.

Notwithstanding the extension of cattle-raising, so that the vast plains west of the Missouri are now pretty fully occupied with cattle ranches, except in the northern part of the country, no product of the soil seems so far from having overrun the demand. Beef continues dear, compared with breadstuffs or pork, and we do not increase our exports. For four years these exports have been:

	1881.	1882.	1883.	1884.
Fresh beef	90,784,881	53,983,730	110,028,722	115,782,231
Salt beef	42,537,126	40,517,648	46,443,037	37,650,416
Tallow	69,183,993	39,381,825	57,258,054	52,666,985
Butter	21,220,311	7,637,249	22,289,560	21,289,665
Cheese	140,358,094	103,739,207	110,175,141	109,212,430

There is a decrease in everything in 1884 compared with 1883, and since 1881 the only increase worth mentioning is in fresh beef, and the increase in that is equivalent to only about 24,000 good head of cattle, which is about two weeks supply for New York city, and about four days' receipts at Chicago.

Beef, butter and cheese are the costliest articles of ordinary food, and those in which we should expect a decrease of consumption when times are hard, incomes fall off, and many men are thrown out of employment; but the cattlemen have been breeding as fast as they can, and the number marketed has increased every year till last year, and we have had no larger surplus to export. Perhaps one of the effects of the large corn crop will be to make more beef from the same number of cattle, and so cheapen good meat (which alone is exported) that we may begin to increase our exports now. There is no sign of this yet, however, the December exports having been about the same as the year before.

Record of New Railroad Construction.

Information of the laying of track on new railroads in the current year is given in the present number of the *Railroad Gazette* as follows:

Louisville, New Orleans & Texas.—The *Arkansas City Branch* is extended west (in Mississippi) to the Mississippi River, opposite Arkansas City, 7 miles.

This is a total of 7 miles, making 12 miles thus far reported for 1885. The new track laid to the corresponding date for 14 years past has been:

	Miles.		Miles.
1885	12	1878	..
1884	27	1877	..
1883	37	1876	24
1882	39	1875	33
1881	47	1874	32
1880	62	1873	..
1879	..	1872	22

This statement covers *main track* only, second tracks and sidings not being included.

The Elements of Railroading.

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XI. SURVEYS—CONSTRUCTION.

The organization of the engineering party for the survey of a new railroad is usually intended to be a temporary one, yet its results are often enduring in their effect upon the road and upon the persons engaged in the surveys; the men, who go as rodmen, chainmen, and axemen, naturally become attached to the road in one capacity or another, even if a long interval shall elapse between the first surveys and construction. When the ground is broken, they will surely be at hand, and persist in being identified with the fate of the enterprise. It is, therefore, worth while, in the beginning, to select the men with care; and if the men, of course, all the more the officers who are to command them.

The chief engineer in charge of the surveys should be chosen for well-known ability and experience in construction, united to an acquaintance with the needs of a road in operation; and not for any other kind of availability. An ignorant or unskillful location may cost not only unnecessary sums in construction, but perpetual expenditures afterward in the cost of hauling trains, or large outlays to remedy the defects of the road as first built. We may imagine a piece of country in which the location or construction of a railroad would be a very simple matter; but a region which is at all difficult will present problems requiring a high order of talent for their solution.

These are truths which are perfectly familiar to engineers; but are so often ignored by capitalists, or by their representatives, who undertake the direction in the building of railroads, that it seems advisable to reassert them whenever there is a favorable opportunity to do so.

The best location cannot be determined except upon the ground; the most trained and expert imagination cannot take in from contour maps all the details which are seized on a view of the problem upon the natural scale. The maps may be of great value in its determination after a study of the ground, or they may enable an experienced person to form an opinion as to whether a location is good or decidedly bad; but a line drawn in the office by the chief engineer, when he has not had time to visit the spot, is not sure to be the best. On this account, the final surveys should not be too much hurried; if a necessity for haste exists, then there is necessity also for more than one engineer to whom the decision of difficult problems may be confided; for, it is insisted upon, they ought to be decided in the field. It seems frequently to be supposed that it is the instruments which perform the location, and not the understanding and judgment which direct them.

It is a mistaken economy which strives to accomplish cheap surveys, or a cheap supervision of the construction of a railroad.

In setting out upon a railroad survey, it is not uncommon for a party to proceed like an army in the enemy's country, without the smallest regard to the rights of the proprietors over whose land they must pass; trampling growing crops, throwing down fences, cutting valuable trees, appropriating fence rails or fence boards to make stakes, and afterward expressing surprise at the unfriendly disposition of the owners of the soil. The dislike of the railroad company and of railroad men which this first impression engenders, frequently endures, in an agricultural community, for many years after the railway has gone into operation; nothing could be more impolitic than such a beginning, and nothing is more unnecessary. Of course, it is not possible to avoid crossing the fields, but straggling through them can be prevented; when a fence is taken down it should be carefully restored; a valuable tree should not be cut, except upon final location; and then it should be explained to the owner that he will be paid for it. As "a soft answer turneth away wrath," so an expression of regret to him at the invasion of his domain, which duty has compelled the party to make, and an assurance that it shall do as little injury as possible, will often convert him into a friend, especially if he finds it to be true that he is not damaged more than need be. For this reason, the material for stakes should be purchased; the best way where there is a saw-mill convenient, is to have them manufactured in bundles, and delivered at the most convenient points. They will be better stakes, and cost less than if the material for them is stolen, and they are made in the field by an axeman.

After the line has been determined, it is very prudent, and will prove most convenient, to fix it at frequent intervals by references, recorded in the note-books, to permanent objects beyond the margins of the works, such as trees, ledges, heavy boulders, fence-corners and buildings, where they can be availed of; and by reference-plugs when they cannot. No one can foresee at what moment operations may be suspended, nor for how long, nor what may befall the stakes or the centre plugs, which are sometimes plowed up, often maliciously removed by persons who have a grudge to satisfy, and always exterminated by the operations of the contractors. With frequent reference points in his notes, the constructing engineer can smile at the attempts to annoy him in this way; and if the completion of the work should be delayed, even for a generation, his successor will bless him for the ready means which he has provided for restoring his line.

Having in view the various possibilities which may devolve upon another the completion of the work which he has begun, the conscientious engineer will require that all note books shall be dated and shall state by whom the notes were written; and, so far as practicable, to what they refer. If the final location is arrived at, or what is presumed to be such, the note-books, plans and profiles having reference to it should be inscribed accordingly, and should be carefully annotated if any subsequent change is made. There is no minute detail which does not become precious to any one who follows a preceding engineer upon railroad work, and it is each one's duty to make his notes so full that they shall be easily understood by whomsoever he may be succeeded; yet the characteristic of many note-books, as also of many office plans and profiles, is meagreness; they contain nothing that could possibly be omitted, and rarely anything by which the part of the world to which they have reference can be readily known. Of course those now referred to are the working plans. It is probable that their incompleteness is due to the haste with which nearly all office work must be done, and to the fact that no one is expected to use them except he who makes them or who has them made. Yet a title and a date, if only in pencil, will be a sure guarantee of future usefulness, and should be invariably required by instructions to all assistants and draughtsmen from their superiors. The discovery of such a date upon a plan which bore the outlines of the then condition of an important work once proved the chief means by which a great lawsuit was decided, for it enabled the principal witness to recall the circumstances under which he had made the plan, which was then only to be used for an approximate estimate; but, after ten or twelve years had elapsed, became valuable for a final one.

There should always be more than one copy of all notes of information of any kind which is likely to be permanently valuable. Immense damage and uncertainty may result from the loss of a note-book, if it contains, for instance, the only notes of the first cross-sections of borrow pits or other excavations; a loss which is not only possible, but, according to experience, is a frequent one. Even if the information which is lost could be recovered, it is cheaper and more convenient to have recorded it in the office, than to be compelled to make another survey. Let no haste, or other consideration, tempt an engineer to permit any excavation to be attacked, before all the cross-sections of the surface have been taken which will be required for an accurate estimate; for he cannot foresee the causes of delay which may intervene before he can perform the leveling, after the digging has begun.

Shrewd contractors are on the look-out for such instances of neglect, and will take advantage of them, when they claim, as they often do at the last, an underestimate. At such a time when before the courts, the engineer's judgment or recollection as to the surface of the ground is no more valuable than that of the contractor's foremen; but his instrumental determination of it is generally conclusive.

Specifications generally do, and always should, provide that borrow-pits must be finished to regular lines and surfaces, according to the directions of the engineer; yet they are almost always left unfinished to any line and in a condition to be an eyesore to every traveler; filled with scattered stumps, boulders and pools of stagnant water, making the area over which they extend unfit for any use whatever.

Even if some small economy were effected by leaving them in this disorderly state, it could not justify the conversion of a fair piece of hillside or meadow into a hideous pit, to deface the railroad margin and the neighborhood; but usually the contract price covers the cost of having the ground left in acceptable shape, and only the engineer in charge is to blame that it is not left so. He should remember that, although he may be building through a wilderness, his work is likely to make it "blossom as the rose," for population surely follows the railroad. Even in the wilderness the roadway should be neat and orderly, first, as a matter of discipline, and second, because it is easier and cheaper to keep it so than to neglect it. The twigs and weeds can be easily mowed, and burned while small; if neglected, they will intrude beyond endurance, and when they have grown strong the task of clearing the roadway is a serious one. It is not alone as to borrow-pits that the specifications are not enforced, or purposely say more than they intend, leading to loose habits and bad work; for the contractor seeks to avoid compliance in particulars of importance, because others of less consequence are not firmly insisted upon. The just way is carefully to prescribe in them exactly what will be required, and no more.

In nothing is the mechanical law, that what is gained in speed is lost in power, more clearly exemplified than in the engineering department of a railway, both in surveys and in construction. If there is much important work, and it is to be *pushed*, the number of the engineers in charge must be increased in proportion to the vigor required. One engineer, however competent, is physically capable of only a certain amount of oversight, and no satisfactory results can be relied upon except through supervision by persons of judgment and experience. The faults of construction which have been lamented upon so many railroads, after they have gone into operation, have been due chiefly to the insufficiency of the engineering force employed. If a sufficient number of assistants have been engaged, the low rate of pay allowed has not been enough to secure men of experience to decide wisely the innumerable problems which must be promptly settled, so that the work shall not be delayed. Left to himself, the Chief Engineer, if competent, will rarely fail to provide an efficient and capable staff; he is generally limited in this respect by the financial administration, and makes up by his own overwork so much of the deficiency as he can. The remedy for this must, perhaps, be left to time, showing by unfortunate experiences the bad results of a mistaken policy. Examples are plenty enough already, if they had their due effect.

It would be better for the company that the chief engineer should err in having too many competent assistants, rather than by having employed too few; for the loss in the first instance would be limited to a few salaries, and to the period of construction; in the last instance the damage may be incalculable and perpetual.

The most critical of all work upon a railway is the construction of foundations, whether for the more important bridges or for culverts which are comparatively insignificant in magnitude, but which may involve by their failure the most serious destruction of life and interruption of traffic. The decision of the vital questions affecting these smaller structures, as the depth to which the excavation shall be carried, and the sufficiency of the bottom, is very often left to the sub-assistant, which is really a criminal neglect of duty on the part of the division engineer, if it comes from laziness or indifference on his part; if from having too much else to attend to, he is certainly bound to protest to his superiors against being compelled to neglect the most important service upon which he can be employed. There are occasional failures of works of masonry due to their faulty workmanship, or to an insufficient thickness of the walls, but they are rare in comparison with the numbers which fail from defective foundations, and it is to this part of his work that the engineer, the less experienced one particularly, should give his most earnest study. With all the information which he may derive from text-books and from the published examples of the works of others, he will find occasion for the use of his best common sense to apply his learning to the case in hand.

The great value of concrete in foundations is slowly coming to be appreciated, yet is not availed of largely in railway works, except those of the most imposing character; while its cheapness, convenience and superiority in all respects to any other sort of base, should recommend it for universal use. It enables the engineer to build his superstructure on a monolith as long, as wide and as deep as he may think best to construct, which cannot fail in parts, but must go all together, if of suitable proportions.

We are favored in this country with cheap natural cements of excellent quality, seldom quite equal to the artificial cements in strength, but sufficient for all needs in walls and foundations, if properly chosen and carefully inspected; but nothing is more likely to vary than one lot of cement from another of the same manufacture. It demands, therefore, great care in its use to obtain the best results; but these are so valuable when attained, that no masonry should now be built without cement mortar. The common mortar of quicklime and sand is not fit for thick walls, because it depends upon the slow action of the atmosphere for hardening it, and, being excluded from the air by the surrounding masonry, the mortar in the interior of the mass hardens only after the lapse of years, or perhaps never; the mortar of cement, if of good quality, sets immediately, and continues to harden without contact with the air, and, so far as is known, forever.

At the time when track-laying begins, the engineering force is fully employed in hastening the completion of the grading, running lines and centres, and is probably harassed also by the demand for final estimates from impatient contractors. It will often be convenient, therefore, to place the inspection of lumber, sleepers, rails, spikes, bolts, angle plates and similar supplies for the superstructure, in charge of a separate department organized to receive and forward these materials to the places where they are to be used. The inspector can usually act as a tallyman and as a forwarding agent also; he should be governed in his inspection by the specifications from the engineers.

However this may be arranged, it will be found advantageous to have all supplies inspected, and as near to the place of manufacture as possible; for there will often be some materials offered which ought to be rejected, and there will be no loss suffered from transportation, and therefore less occasion for protests on the part of manufacturers when they are thrown out before shipment.

Steel rails need to be examined to insure that they are not brittle, that they are straight, of exact height, not depressed at the ends (a common and serious defect, and not to be remedied in the track, is this depression), and that they do not vary unreasonably in length. Of course they must be inspected for flaws; but the mills do that usually quite thoroughly, since they have a good market for rails of second quality. The common defects in spikes are brittleness and imperfect points; in joint-bolts, bad material, loose nuts, shallow threads; in angle-plates, a variation from the true section which makes them fit badly—a serious and not uncommon fault. It will require careful tallying and careful accounting to keep track of all the materials, to insure that none are stolen, and, more than all, that none are wasted. If track is laid by contractors, the proper allowance of them per mile should be determined and delivered to them upon receipts; otherwise the spikes and joint-bolts will be scattered and buried, as if they were without value.

CHARLES PAINE.

Annual Meeting of the American Society of Civil Engineers.

The annual meeting of the American Society of Civil Engineers was held at the house of the Society on Wednesday, Jan. 21, Vice-President Wm. H. Paine in the chair. Over 100 members were present.

The annual report of the Board of Directors showed that the total additions to the society during the year, of all classes, had been, deducting 11 transfers from one grade of membership to another, 100; less losses by death (11) and resignation (6), making the net addition to membership 83. The total number connected with the society Jan. 1, 1885, was 878.

The increase is the largest in the history of the society, it having been last year but 37.

In addition to the annual meeting and annual convention, 18 regular meetings had been held, the increased attendance at which, especially of non-resident members, had been noticeable. The plan of sending printed reports of all meetings to all members had recently been adopted and generally approved.

The house of the society was now about half paid for by subscriptions outside of the regular income.

The amendment to the by-laws, requiring that the names of all candidates for membership shall be sent to all members 30 days before the same are acted on by the Board of Directors, had been adopted.

The membership badge had been procured by 322 members. Objections to the design, however, had been urged by many members, and 93 had requested in writing that the matter should be submitted to letter ballot. Constitutional objections had heretofore prevented doing so.

The report of the Treasurer showed that the receipts had been $17,699 and the ordinary expenses $14,640. The cash on hand, including $426 of the building fund, was $4,976. The total invested funds of the society, of all classes, were $33,924.

The Norman medal and Rowland prize, for the year ending August, 1884, were, by report of the appropriate committees, awarded respectively to Mr. James Christie, for his paper on Experiments on the Strength of Wrought Iron Struts; and to Mr. Hamilton Smith, Jr., for his paper on Water-Power with High Pressure and Wrought-Iron Water Pipe.

The constitutional amendment providing for the compounding of annual dues by the payment of $250 was then taken up, and after general discussion Messrs. Wellington, Shinn and Cooper were appointed a committee to draw up an amended form, which was accepted and recommended for letter ballot. The change made was that resident members should remain permanently liable for the difference between the resident and non-resident dues, instead of for only five years, unless they elect to compound for the same by a payment of $75. It was also provided that all receipts in commutation of dues should be permanently invested, the interest only being available for current expenses.

The tellers then reported that Mr. Frederick Graff, of Philadelphia, had been elected President for the ensuing year, with other officers, as elsewhere noted.

The death of John B. Jervis was then announced, and Mr. W. P. Shinn delivered a feeling address on his life and character.

The Committee on Standard Time reported that since last June the committee had communicated with a large number of prominent men in all parts of the country, and found 92 per cent. decidedly of the opinion that the hours should be counted in a single series from zero to 24. Replies were also received from 171 railway officials, presidents, managers, and superintendents, of whom 98 per cent. expressed their sympathy with the movement, and stated that they would be prepared, when it was ascertained that the feeling was general, to abandon the old twelve-hour system. The officials who will support the 24 hour system represent 59,100 miles of railway. The telegraph interests were also reported in full sympathy with the new system, and the President of the Western Union was given as authority for the statement that, besides reducing the number of errors, fully 150,000,000 letters would be saved annually in transmission if it were adopted. The committee thought the day not far distant when a change would be actually accomplished, and by the railway companies. It was recommended that railway companies should provide small supplementary dials to be pasted upon the dials, of the watches of all employés, and dials of proper dimensions to be pasted on station clocks, to familiarize the public with the system. It is said that several railway companies have already taken steps to do this. A committee from the society will probably be sent to the Railway Time Convention, which is soon to be held.

The Committee on Uniform System for Tests for Cement made a valuable and exhaustive, yet concise, report on the best practical method of testing all qualities and kinds of cement, specifying precisely what tests it was expedient to make and the kind and cost of the necessary apparatus. A special vote of thanks to the committee, of which Gen. Q. A. Gilmore was chairman, was passed, and the subject was then discussed at some length.

The committee on Preservation of Timber also submitted a valuable report, which there was not time to discuss in detail.

The question of time and place for the next annual convention was after considerable discussion referred to the Board of Direction, with power to act.

The sessions occupied the entire day, lunch being served at the Society house. A meeting was also held in the evening, at which a committee was appointed to confer with the Mechanical and Mining Engineers on a joint technical library. On Thursday the members in attendance visited points of engineering interest in the vicinity of New York, visiting the large water gas-works of the Consolidated Gas Co., at the foot of East Twenty first street; the elevators and wire rope apparatus at Dow's stores, Brooklyn; the new Washington Building (where the Society, by invitation, lunched with Mr. Cyrus W. Field); the new Produce Exchange Building, and especially its very elaborate elevator service; the Brooklyn Bridge and the central station of the United States Electric Illuminating Co., the largest in the city.

In the evening a reception for gentlemen was held at the house of the Society, which was well attended.

Transportation in Congress.

In the Senate on the 16th:

The Senate Inter-state Commerce bill was discussed at much length, with especial reference to an amendment offered by Mr. Slater (Oregon) prohibiting higher charges for short than for long hauls. The amendment was strongly opposed, notably by Mr. Brown (Georgia), who made a long speech against it.

In the House on the 16th:

A bill was passed authorizing the construction of a bridge over the Mississippi at Memphis, Tenn.

The conference committee on the bill to forfeit the Atlantic & Pacific unearned land grant reported that the Senate insisted on its amendments. The House voted to insist on its disagreement thereto, and a new conference committee was appointed.

In the Senate on the 17th:

The Senate Inter-state Commerce Bill was again taken up, the pending question being on Mr. Slater's amendment prohibiting higher charges for short than for long hauls. After brief discussion Mr. Slater's amendment was rejected—ayes 11, noes 32.

An amendment proposed by Mr. Allison was agreed to—ayes 22, noes 20—increasing the number of commissioners from five to nine, and amending the latter provision so as to require that not more than five of them shall belong to one political party. Mr. Allison's amendment also provides that one of the commissioners shall be selected from each of the judicial districts of the United States.

An amendment offered by Mr. Pugh was agreed to, limiting the powers of the commission to the powers specifically given by the bill.

The amendments to the bill having been completed, the House Inter-state Commerce bill was taken from the calendar, and Mr. Cullum moved to amend it by striking out all after the enacting clause and inserting the provisions of the Senate bill.

Mr. Vest called for the ayes and noes. Without action the Senate adjourned.

It is understood that the Senate Judiciary Committee has decided to report what is known as the 60-years bill in relation to the Pacific railroad debts. It provides for the extension of the debt over 60 years, payable in semi-annual installments, with interest calculated at 3 per cent.

TECHNICAL.

Locomotive Building.

The Baldwin Locomotive Works in Philadelphia have just completed four heavy passenger engines for the Richmond & Danville road.

The Chicago, Burlington & Quincy shops at Aurora, Ill., are building a shifting engine with 18 by 24 in. cylinders, to be used in the Chicago yards.

Car Notes.

Mr. Joseph Sprague has resigned his position as President and Superintendent of the Ohio Falls Car Co. at Jeffersonville, Ind., after many years' service in charge of the shops there.

The Litchfield Car Works at Litchfield, Ill., are building 25 stock cars for the St. Louis, Hannibal & Keokuk road.

Bridge Notes.

The Philadelphia Bridge Works of Cofrode & Gaylor, at Pottstown, Pa., have just completed an iron bridge of 72 ft. span over Codorus Creek at Valley Junction, Pa., on the Hanover Junction, Hanover & Gettysburg road.

The new bridge over the Ashley River at Drayton, S. C., on the Charleston & Savannah road, is completed. It has a draw-span giving a clear opening of 80 ft. on each side of the centre pier. It is built of iron on a foundation of creosoted piles, and in accordance with plans furnished by Mr. W. B. W. Howe, Jr., the Chief Engineer of the road. The contractor for the work is Mr. A. V. Gude, of Atlanta, Ga. The iron work has been done by Wilkins, Post & Co., of Atlanta.

The Indianapolis Bridge Co. has secured the contract for an iron highway bridge over the Muscatituck River at Newry, in Jackson County, Ind. The abutments are to be of iron.

Iron Notes.

The firm of Oliver Bros. & Phillips and the Oliver & Roberts Wire Co., in Pittsburgh, suspended payment Jan. 15, and asked for a meeting of their creditors. The firm, though not an old one, having been established only 17 years ago, is one of the largest iron houses in Pittsburgh, and their suspension caused a considerable shock to the trade. No full statement of liabilities has yet been made, but they are supposed to be not far from $2,500,000. The assets, it is thought, are sufficient to meet all liabilities; but, being largely in the form of machinery and manufacturing plants and real estate, they cannot be realized without considerable time. It is thought very probable that the creditors will grant an extension to enable the firm to go on. The failure is said to be the result of undue extension of business and too large investments in unproductive property.

The Chicago mill of the North Chicago Rolling Mill Co. resumed operation Jan. 19, having been closed since September last. The company's Milwaukee works are now all in operation with the exception of the blast furnace. The South Chicago mill, which is used entirely for the manufacture of steel rails, will not be started up at present.

The New York & Ohio Iron & Steel Co., at Ironton, O., is at present running its mills on old steel rails, which are being rerolled by a new process.

The Helmbacher Forge & Rolling Mill Co., in St. Louis, has started up its puddling furnaces and will keep them at work probably for some time to come.

The Irondale Furnace property near Steubenville, O., was sold at sheriff's sale Jan. 12, and bought by D. W. C. Carroll and others, who, it is stated, will pull down the mill and sell the machinery and materials.

Mr. Henry Childs has sold the Buffalo Steam Forge in Buffalo, N. Y., to the new firm of Gould & Stimson, who will carry on the business. The new firm intend to enlarge the works and put in two new hammers, which will be used on locomotive frames, car forgings and similar work.

The Kemble Iron Co. has been organized by the parties who bought the property of the Kemble Coal & Iron Co. at Riddlesburg, Pa. The new company has $100,000 capital stock, and issues $500,000 in mortgage bonds, and will put the furnaces in operation again as soon as possible.

The National Tube Works, at McKeesport, Pa., have resumed work, but the wages of the men have been reduced 10 per cent.

The Crawford Iron & Steel Co. has its Neshannock furnace at New Castle, Pa., in blast.

There are now only five furnaces in full blast in the Mahoning Valley, of which two are at Brier Hill, one at Hubbard, one at Lowellville and one at Youngstown.

Powelton Furnace in Bedford County, Pa., has been in continuous blast since October, 1882, and has made during that time over 50,000 tons of pig iron.

The Saucon Iron & Railroad Co. has been organized by the parties who bought the Saucon Iron Works at Hellertown, Pa. The Thomas Iron Co. controls the new organization.

Manufacturing and Business Notes.

The Atchison, Topeka & Santa Fé Co. has bought outright the privilege of having the Robinson switch-stand and the Cooper wrought head-chairs made free of royalty for all its own and leased lines, including the Southern Kansas, the Sonora and the Atlantic & Pacific. The Standard Switch Co. is the owner of the several patents.

Mr. F. W. Richardson, of Troy, N. Y., has made arrangements with the Pennsylvania Railroad Co. to use his balance-valve as a standard slide-valve for all its locomotives. The valve will be put upon the engines of the road as fast as it can be applied.

The Harlan & Hollingsworth Co., in Wilmington, Del., has launched a transfer boat to run between Norfolk, Va., and Cape Charles for the New York, Philadelphia & Norfolk road. The boat is 262 ft. long on the deck, 36 ft. beam; breadth over guards, 64 ft.; depth of hold, 14 ft. She is built extra strong, of iron, and is expected to make eighteen miles an hour. She can carry two Pullman sleeping cars, an express car and a combination car on her deck, and is fitted up with saloon, cabin, etc., and is to be handsomely furnished and illuminated by electric lights. The engine is of the walking beam pattern, the cylinder being 54 in. diameter and 11 ft. stroke.

Messrs. J. H. Williams & Co., of Brooklyn, have formed a partnership with W. H. Brock, of Corona, L. I., materially adding to their facilities and machinery. They will manufacture the Brock chain pipe-wrench and other specialties, in addition to their former manufacture of iron and steel drop forgings of every description.

The Rail Market.

Steel Rails.—The market is not active, and only small orders are reported, for which quotations are $28@$28.50 per ton at mill. Some large orders are said to be held off for lower prices, but makers do not seem disposed to go below $27 50, even on desirable orders.

Rail Fastenings.—Quotations are still nominally 1.90@2 cents per pound for spikes in Pittsburgh, 2 25@2 50 cents for track-bolts and 1.65@1.75 cents for splice-bars. The market is very dull and no sales are reported.

Old Rails.—Old iron rails are quoted at $17.50@$18 per ton at tidewater, with no large sales. Old steel rails are quoted in Pittsburgh at $16@$17 per ton, according to length.

Car Couplers.

The Boston & Maine Co. has contracted for the equipment of all its freight cars with the United States coupler. The contract covers its leased and controlled lines also, including the Eastern, the Maine Central and the European & North American roads.

THE SCRAP HEAP.

A New Luxury (?) in Cars.

The *Railway Express* says that "Messrs. Brown & Marshall, at their railway carriage works, Saltley, near Birmingham, have commenced the construction of railway piano saloons, somewhat after the fashion of those already adopted in Germany. Ingenious appliances have been provided for deadening the noise of the wheels, so as to preserve the harmony of the music. The saloons are about as long as a double carriage, measuring 52 ft." This adds a new torment to traveling.

Waiting for Robbers.

Passenger to conductor: Look here, aren't we behind time?

Conductor: Yes, sorter.

Passenger: Then why don't you run faster?

Conductor: Because we are waiting for two men and a boy to catch up.

Passenger: What for?

Conductor: They are going to rob the train.—*Arkansaw Traveller.*

The Safest Part of a Car.

It was well said by the conductor, who, when asked what was the safest part of a car, replied, "That part which happens to be in the shop at the time of the accident." It is a popular superstition that the centre of the car is not only the safest part, but is also much the easiest riding. One of the greatest trials of a Pullman conductor's life is the fact, that about every passenger asks for a lower centre berth the first thing, and is frequently indignant because it cannot be had. If the centre of a car rides any easier than the end then our cars, built as solid and as strong as they are, spring up and down in the middle precisely as does a buckboard. If they do not, why should it ride any easier? As for safety, if you are in the rear of the last car on the train and another train runs into the rear, you are liable to get hurt. In all other accidents you can conjure up as liable to occur, it is the safest. If a head collision there is nothing back of you to add force to the blow. If the car leaves the track and collides with a bridge or any obstruction on a side track it will not be in your end. If the train is thrown down an embankment, there is nothing to land on top of you. Then, this location is the most pleasant. From it you can watch all the movements of your fellow passengers, often a good way of passing the hours of a long and tedious journey. If your eye happens to catch a particularly fine view, you can, by turning in your seat or stepping to the door, take it all in. If there is a safest part of a train it is in the last seat in the last car.—*Elmira (N. Y.) Railroad News.*

The Usual Way.

They had gathered in secret convention, agreed upon a scale of prices for coal, fixed a penalty to be enforced in case any member cut rates, and adjourned with the greatest good feeling, but it wasn't a month before it was known that somebody was playing false. The delinquent was finally spotted, and hauled up for investigation when he explained:

"Yes, gentlemen, I plead guilty, but hear me out. I cut rates on 20,000 tons, but the buyer assured me on his solemn honor that if I didn't give him 10 per cent off he would call upon some of the rest of you and secure double that. Knowing your weakness in the face of large orders, I concluded to prevent your corrupting yourselves. Let us begin all over again."—*Wall Street News.*

Railroad Wages in Missouri.

The report of the Commissioner of labor statistics for Missouri shows that there are 19,486 railroad employés in that state, whose yearly earnings average as follows: General officers, $4,524; assistant and division superintendents, $2,400; civil engineers, $1,884; master mechanics, $3,000; masters of transportation, road-masters and bridge foremen, $1,440; clerks, $732; machinists, $810; passenger conductors, $1,056; freight conductors, $1,080; passenger engineers, $1,080; firemen, $660; wipers, $432; baggagemen, $600; brakemen, $684; station agents, not telegraph operators, $684; station agents, also telegraph operators, $684; telegraph operators, not station agents, $650; carpenters, $780; section foremen, $507; section men, $507; laborers, $343; switchmen and watchmen, $180; bridge tenders and pumpers, $420, and other employés, $592.

A Railroad Race.

Yesterday morning there was an exciting race between two railroad trains coming into Atlanta. Several miles from the city, where the Georgia Pacific and the Western & Atlantic railroads meet, was the beginning point of the race. The state road accommodation was steaming up the river grade, and as it reached the point named the Georgia Pacific dashed out of the woods as it were making the air whizz as it passed along. The two trains were then side by side, and the passengers and train men at once jumped to the conclusion that there was fun ahead. The superior velocity of the Georgia Pacific ran that train half a length ahead, and the passengers on board raised the windows and uttered a series of exultant shouts, made faces at the state road passengers, and some went so far as to put their thumbs to their noses. The state road passengers sent back a defiant yell, and Tom Bussey, the engineer, with a determined expression on his face, motioned his fireman to pile on the coal. Then he steadied himself at the lever and began to draw the throttle back. The engine sprang forward like a spurred charger and instantly the greater possible excitement arose among the passengers, even the ladies and children on both trains raised the windows and waved handkerchiefs, cheered and seemed carried away by the excitement of the novel race. Side by side, over fills and through cuts the trains sped, amidst the wildest enthusiasm. At last Tom Bussey's fireman had things red hot, and the engine began to move up on its competitor. The Georgia Pacific was left behind inch by inch, and as the state road train swept ahead Tom Bussey simply raised his hat to his vanquished brother and said: "Good evening."—*Atlanta (Ga.) Constitution, Jan. 11.*

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Boston & Albany, annual meeting, at the Meionaon, in Boston, at 11 a. m., Feb. 11.

Fitchburg, annual meeting, at the passenger station in Boston, at 11 a. m., on Jan. 27.

Illinois Central, annual meeting, at the office in Chicago, March 11.

West Virginia Central & Pittsburgh, annual meeting, at the office in Baltimore, Jan. 27.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Central Ohio (leased to Baltimore & Ohio), 3 per cent., semi-annual, payable Jan. 31.

Illinois Central, 4 per cent., semi-annual, payable March 2. Transfer books close Feb. 13.

Oregon Railway & Navigation Co., 1½ per cent., quarterly, payable Feb. 2. Transfer books close Jan. 21.

Pullman Palace Car Co., 2 per cent., quarterly, payable Feb. 16, to stockholders of record on Feb. 2.

Terre Haute & Indianapolis, 3 per cent., semi-annual, payable Feb. 1. This company drops from 4 to 3 per cent.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *American Institute of Mining Engineers* will hold its annual meeting in New York, beginning on Tuesday evening, Feb. 17.

The *Car Accountants' Association* will hold its annual convention at Minneapolis, Minn., beginning on Tuesday June 23.

The *Master Car-Builders' Club* will hold regular meetings at its rooms, No. 113 Liberty street, New York, on the evening of the third Thursday in each month. The next regular meeting will be on Thursday, Jan. 15.

The *New England Railroad Club* will hold its regular meetings at its rooms in the Boston & Albany station in Boston, on the evening of the third Wednesday in each month.

The *Western Railway Club* will hold regular meetings at its rooms, No. 103 Adams street, Chicago, on the third Wednesday in each month.

Foreclosure Sales.

The *Cleveland, Delphos & St. Louis* road will be sold, under a decree of foreclosure granted by the United States Circuit Court, at Toledo, O., Feb. 19. The road is of 3 ft. gauge and is in operation from Delphos, O., east to Mt. Blanchard, 46 miles; it was built in 1882. By the latest statement the company had $460,000 first-mortgage bonds and about $100,000 floating debt.

Trunk Line Presidents' Meeting.

A meeting of the Presidents of the Trunk Line railroads began at Commissioner Fink's office in New York, Jan. 16, to discuss the present situation, especially with reference to east-bound freight rates. The meeting was private, but it is understood that nothing definite was done.

Master Car-Builders' Meeting.

A meeting of Master Car-Builders was held at the Tifft House, Buffalo, on Wednesday, Jan. 14.

The roads more or less interested in the interchange of cars at that point were fully represented by either their superintendents of motive power or master car-builders.

Mr. W. D. McWood presided and Mr. T. W. Frederick was Secretary.

The principal topic of discussion was the proper dimensions of limit gauges, which was discussed at length.

Appropriate resolutions on the retirement of Leander Garey from active service as a master car-builder were passed.

It was decided to hold the next meeting in Buffalo on Wednesday, April 8.

American Institute of Mining Engineers.

A circular has been issued by Prof. R. W. Raymond, the Secretary, which says:

"1. The annual meeting of the Institute will be held in New York city, beginning Tuesday evening, Feb. 17. Mr. David Williams, 83 Reade street, is the Chairman, and Mr. William H. Wiley, 15 Astor Place, is the Secretary of the local committee of arrangements. The headquarters will be at the Park Avenue Hotel, Fourth avenue and 32d and 33d streets, where a special rate of $3 per day for rooms and board has been secured for members. Applications for rooms should be addressed to Mr. Henry Clair, Park Avenue Hotel.

"2. Members intending to be present at the meeting, and also those having papers to present, are requested to notify the Secretary of the Institute as early as practicable. No special railway facilities are to be expected for this meeting. Further particulars concerning the meeting will be given in a subsequent circular."

ELECTIONS AND APPOINTMENTS.

American Society of Civil Engineers.—At the annual meeting in New York, Jan. 21, officers were elected as follows: President, Frederick Graff; Vice-Presidents, George S Green, Jr., and Thomas J. Whitman; Secretary and Librarian, John Bogart; Treasurer, J. J. R. Croes; directors, Theodore Cooper, William R. Hutton, Walter Katte, O. Chanute and F. W. Vaughan.

Atlantic Coast Line.—The general organization of this line is now as follows: General Manager, H. Walters, Baltimore; General Superintendent, J. F. Devine, Wilmington, N. C.; Superintendent of Transportation, J. R. Kenly, Wilmington, N. C; Engineer of Roadway, B. R. Dunn, Wilmington, N. C. The line is composed of the following roads: Richmond & Petersburg; Petersburg; Wilmington & Weldon; Wilmington, Columbia & Augusta; Northeastern (South Carolina); Central of South Carlina; Cheraw & Darlington, and Cheraw & Salisbury. These roads are all under the same control, and for operating purposes have a single management, but each retains its local organization and has its own financial officers.

Bachman Valley.—At the annual meeting in Hanover, Pa., Jan. 12, the following were chosen: President, A. W. Eichelberger; directors, H C. Schriver, Joseph Althoff, H. A. Young, J W. Gitt, Stephen Keefer, Levi Dubs, P. R. Pyne, J. K. Boyer, A. L. Boyd, Samuel Thomas, Henry Snue, Jacob Brodbeck.

Baltimore & Hanover.—At the annual meeting in Hanover, Pa., Jan. 12, the following were chosen: President A. W. Eichelberger; directors, David Wills, Charles W. Slagle, R M. Wirt, Henry A. Young, Wm. Grumbine, Stephen Keefer.

Beach Creek, Clearfield & Southwestern.—At the annual meeting, Jan. 12, Wm. A. Wallace, of Clearfield, Pa., was chosen President, with the following directors: S. R. Peale, Lock Haven, Pa.; George H. Platt, Peale, Pa.; W. S. Nearing, Jersey Shore, Pa.; Daniel Beach, Corning, N. Y.; J. M. Gazzam, John G. Reading, Philadelphia; Chauncey M. Depew, L. A. Robertson, James H. Ritter, H. McK. Twombly, Cornelius Vanderbilt, Wm. K. Vanderbilt, New York.

Berlin Branch.—At the annual meeting in Abbottstown, Pa., Jan. 12, the following were chosen: President, A. W. Eichelberger; directors, Jacob Resser, A. W. Storm, W. S. Hildebrand, R. N. Meissenhalter, George Diehl, Wm. Bittinger, Joseph Wolf, R M. Wirt, Stephen Keefer; Secretary, A. W. Storm; Treasurer, Jacob Resser.

Boston & Lowell.—Mr. Lucius Tuttle has been appointed General Passenger Agent of this road, and will have entire charge of all passenger traffic, including advertising, and of the parlor car service; he will have full authority to make rates both for regular and special service, subject only to the approval of the President and General Superintendent.

Mr. B. F. Kendrick, late General Passenger Agent, has been appointed Auditor, with office in Boston.

Boston & Maine.—Mr. Douglas Frazer is appointed Assistant to the President in place of Mr. Lucius Tuttle, resigned. Mr. Frazer has been Auditor of the road for some time.

Bradford, Bordell & Kinzua.—In Bradford, Pa., Jan. 12, the following directors were elected: John J. Carter, Henry F. Sweetser, Titusville, Pa; W. H. H. Newman, Thomas Loomis, Robert P. Wilson John E Ransom, Buffalo, N. Y.; George L Roberts, A. I. Wilcox, W. W. Brown, George A. Eckbert, R. G. Taylor, Bradford. The officers chosen are: President, John J. Carter; Vice-President, Thomas Loomis; Secretary, John E. Ransom; Treasurer, George A. Eckbert; General Manager, B. C. Williams.

There was also a meeting the same day of stockholders of the *Bradford, Bordell & Smethport;* the *New City & Eldred* and the *Bradford, Richburg & Cuba.* These roads, which are known as the Erie's narrow-gauge system, are under the same general management, and the officers chosen were the same as above.

Central Vermont.—The following circular from the President's office announces officially some appointments already noted; it is dated St. Albans, Vt., Jan. 1:

"Mr. James M. Foss, having been appointed General Superintendent of this road and its leased lines, will have charge of the running department of the road, embracing the running of trains, the care and supervision of the track, depots, bridges and other property of the road, under the direction of the General Manager. He will assume the duties of his position from this date. Division Superintendents and heads of subordinate departments will refer details to him.

"Mr. William J. Robertson, having been appointed Superintendent of Motive Power of this road and its leased lines, in place of Mr. Foss, promoted, will have charge of the company's shops and supervision of the locomotives, cars and machinery, and will be responsible for their efficiency and good service. He will, under the direction of the General Manager, employ such men as may be necessary in his department, and discharge them for proper cause. Officers and employés in his department will report to him and receive orders from him, in conformity to existing rules or such as may be hereafter prescribed."

Coudersport & Port Allegheny.—At the annual meeting, Jan. 12, the following directors were elected: F. W. Knox, W. R. Jones, Isaac Benson, A. G. Olmstead, Coudersport, Pa.; F. H. Arnold, Port Allegheny, Pa.; D. B. Hamlin, Smethport, Pa.; C. V. B. Barse, C. S. Cary, Olean, N. Y.; F. H. Root, Buffalo.

Dawson, Broadford & Mt. Pleasant.—This company elected officers as follows in Pittsburgh, Jan. 12: President, W. C. Quincy; Directors, David Hostetter, James I. Bennett, M. W. Watson, James M. Bailey, G. T. Rafferty.

East St. Louis Connecting.—This company last week elected the following officers for the ensuing year: S. C. Clubb, President; F. L. Ridgely, Vice-President; S. A. Chouteau, Secretary, and H. L. Clark, Treasurer.

Hanover & York.—At the annual meeting in Hanover, Pa., Jan. 12, the following were chosen: President, John S. Young; directors, G. D. Klinefelter, S. S. Bechtel, William Young, Wm. J. Young, Isaac Loucks, P. H. Gladfelter, Vincent O'Bold, E. G. Smyser, W. Latimer Small, Henry Small, Harris Wilton, Michael Schall; Secretary, Lewis Grove; Treasurer, John H. Alleman.

Illinois & St. Louis.—In Belleville, Ill., last week, this company elected officers as follows: President, J. W. Brauch; Vice-President, Thos. McKissock; Secretary and Treasurer, P. T. Burke; General Superintendent, C. H. Sharman.

Lackawanna & Pittsburgh.—Mr. Frank S. Smith, of Angelica, N. Y., has been appointed Receiver in place of George D. Chapman, resigned.

Lehigh Valley.—At the annual meeting in Philadelphia, Jan. 20, the following officers were elected for the ensuing year: President, Elisha P. Wilbur; Directors, Charles Hartshorne, William L Conyngham, Ario Pardee, William A. Ingham, George B. Markle, Robert H. Sayre, James I. Blakslee, Joseph Patterson, Garrett B Lindermann, John R. Fell, Robert A. Lamberton, John B. Garrett.

Louisville & Nashville.—The following circulars from General Manager R. Wells are dated Louisville, Ky., Jan. 15:

"Mr. George E. Evans is appointed Superintendent First Division Main Stem and Knoxville Division, vice Mr. W. P. Harris resigned. Appointment to take effect Jan. 26.

"Mr. B. C. Epperson is appointed Superintendent of the Mobile & Montgomery, Montgomery & Selma, and Selma & Pine Apple divisions, vice Mr. M. S. Belknap, resigned. Appointment to take effect Feb. 1."

Monongahela & East Shore.—This company elected officers as follows in Pittsburgh, Jan. 12: President, W. C. Quincy; Directors, John Newell, David Hostetter, James I. Bennett, M. W. Watson, Henry Hice, Herbert DuPuy, Wm. M. Lyon.

Monongahela & Youghiogheny.—This company elected officers as follows in Pittsburgh, Jan. 12: President, W. C. Quincy; Directors, John Newell, David Hostetter, James I. Bennett, Henry Hice, Herbert DuPuy, Wm. M. Lyon.

Moorhead & Southwestern.—In Moorhead, Minn., Jan. 10, this company elected the following officers: President, F. J. Burnham; Vice-President, Andrew Holes; Secretary, Thomas C. Kurtz; Treasurer, B. F. Mackall; General Manager, W. H Davy; Engineer-in-Chief, O. W. Burnham; Attorney, R. R. Briggs.

New England General Freight Agents' Association.—In Boston last week the following officers were elected: President, H. H. Marshall, Boston, Barre & Gardner; Vice-President, S. Barrett, Concord; Secretary and Treasurer, W. J. Willard, Passumpsic.

New Orleans & Northeastern.—Mr. Edmund L. Tyler has been appointed Superintendent, with headquarters at New Orleans.

New York Central Sleeping Car Co.—Dr. W. Seward Webb has been chosen President of this company, in place of Mr. James Fillinghast. Dr. Webb is a son-in-law of Mr. William H. Vanderbilt.

New York, Lake Erie & Western.—The Board has elected Mr. S. M. Felton, Jr., Vice-President, in place of George R. Blanchard, resigned. Mr. Felton was for a number of years Superintendent of the Pittsburgh, Cincinnati & St. Louis, and afterward General Manager of the New York & New England. He has been with the Erie for about a year, first as Assistant to the President and lately as General Manager of the New York, Pennsylvania & Ohio.

The Board has also elected Edward White Treasurer of the company, in place of C. G. Lincoln, deceased. Mr. White has been Assistant Cashier of the Chase National Bank of New York.

New York, Ontario & Western.—At the annual meeting in New York, Jan. 21, the following directors were chosen: Edward F. Winslow, Horace Porter, Richard Irvin, Jr., Henry Amy, Thomas P. Fowler, Charles Bard, John B. Kerr, Charles S. Whelen, Walter Katte, John L. Nesbit, Alexander Taylor, Jr., Thomas Swinyard, Arnold Marcus.

Oregon & California.—The United States Circuit Court has appointed R. Koehler and A. G. Cunningham Receivers of this road, on application of the bondholders.

Philadelphia & Reading Leased Lines.—At adjourned meetings in Philadelphia, Jan. 19, officers were chosen as below by the companies named, whose properties are leased to the Reading Co.: *Mt. Carbon & Port Carbon.*—President, George deB. Keim; Managers, J. B. Lippincott, F. A. Comly, Joseph Wharton, John Wanamaker, A. Hewson, I. V. Williamson; Secretary and Treasurer, P. C. Hollis. *Mill Creek & Minehill.*—Same as above. *Schuylkill Valley.*—Same as above.

Pine Creek.—At the annual meeting in Wellsboro, Pa., Jan. 12, Henry Sherwood was re-elected President, and the following directors were chosen: J. Harrison, John W. Bailey, Anton Hardt, Walter Sherwood, J. B. Niles, William Howell, E. G Schieffelin, Geo. J. Magee, Wm. H. Vanderbilt, Wm. K. Vanderbilt, Cornelius Vanderbilt, Chauncey M. Depew. The directors are the same as last year, except Mr. Depew, who succeeds the late Augustus Schell.

Pittsburgh & Neville Island.—This company elected officers as follows in Pittsburgh, Jan. 12: President, J. M. Phillips; Directors, H. H. Marcy, T. L. Kennedy, Wm. Vankirk, John F. Dravo, W. L. Vankirk, H. I. Morris, J. R. Pittock, John H. Hamilton.

Portland & Ogdensburg.—At the annual meeting in Portland, Me., Jan. 20, the following directors were chosen: C. H. Amsden, Samuel J. Anderson, J. P. Baxter, Francis Fessenden, George E. B. Jackson, Horatio N Jose, W. F. Milliken, J. S. Ricker, R. M. Richardson, Stephen R Small. The board re elected Samuel J. Anderson, President; Chas. H. Foye, Clerk.

The Supreme Court has appointed Thomas H Haskell a trustee under the mortgage, in place of Samuel E Spring, deceased. The other trustees are P. H. Brown and W. F. Milliken.

Rochester & Ontario Belt.—At a recent meeting in Rochester, N. Y., the following named were elected: H. K. Southwick, William M. Schaffer, Thomas B. Browning, Andrew H. Cargill, George M. Rollins, William Elder, Lewis A. Mathers, J. A. Haskell, George E. Merchant, Edwin O. Coles, I. S. Emery, John F. Dinkey, Herbert P. Brown. The following officers were then elected: George E. Merchant, President; George M. Rollins, Secretary; John F. Dinkey, Treasurer.

Shoustown, Clinton & Frankfort.—This company elected officers as follows in Pittsburgh, Jan. 12: President, Jos. B. Williams; Directors, Marshall McDonald, W K. Gillespie, W. B. Lucas, Peter Sprague, W. R. Kirkpatrick, J. H. Lippincott, James Williams.

Terre Haute & Indianapolis.—At the annual meeting in Terre Haute, Ind., Jan. 6, the following directors were chosen: William R. McKeen, Delos W. Minshall, Josephus Collett, George E Farrington, F. C. Crawford and John G. Williams. Mr. Williams is a new director, succeeding the late Alex. McGregor. The board elected William R. McKeen President; George E. Farrington, Secretary; J. W. Cruft, Treasurer.

Texas & New Orleans.—At the annual meeting in Houston, Jan. 15, the following directors were chosen: J. F. Crosby, E. H. Hill, T. W. House, Houston, Tex.; T. W. Peirce, Boston; Isaac E. Gates, C. P. Huntington, J. T. Terry, New York.

Texas & Pacific.—Mr. O. H. Haynes, Superintendent of Motive Power, takes charge of the car department also, in place of John Hodge, resigned. His office is at Marshall, Texas.

Union Pacific.—The following circular from the office of General Superintendent S. T. Smith is dated Omaha, Neb., Jan. 13.

"Mr. Robert Blickensderfer is appointed Superintendent of the Idaho Division, with headquarters at Pocatello, Idaho. His orders will be respected and obeyed accordingly. To take effect this date."

Utica, Clinton & Binghamton.—At the annual meeting in Utica, N. Y., Jan. 19, the following directors were chosen: George B Phelps, Isaac Maynard, R. S. Williams, John Thorn, W. M Storrs, G. W. Adams, Frank D Beebe, A. N. Sheldon, Allen Curtis, John W. Lippitt, Allen W. Reynolds, William S Bartlett, James I. Scollard. At a subsequent meeting of the directors the following officers were elected: President, Isaac Maynard; Vice-President, George B. Phelps; Secretary and Treasurer, R. S Williams; Assistant Treasurer, F. J. Callanen; Superintendent, Roger Rock.

Virginia & Carolina.—The officers of this company are: President, I. P. Prinston; Vice-President, P. A Weilford; Chief Engineer, W. S. Green. Headquarters, Richmond, Virginia.

Waynesburg & Washington.—The following directors were elected at Washington, Pa., Jan. 12: President, J. S. Temple; Directors, Jacob Sevart, Julius LeMoyne, R. A. McConnell, W. T. Lantz, J. W. Ritchie, Demas McCollum, Bazil Gordon, D. A. Spragg, T. W. Sayers, Samuel Luse, Aaron Day, E. M. Sayers.

Western Society of Engineers.—At the annual meeting in Chicago, Jan. 6, the following officers were chosen: President, Benezette Williams; First Vice-President, Octave Chanute; Second Vice-President, Samuel McElroy; Secretary, L. P. Morehouse; Treasurer, Charles Fitz Simons; Librarian, G. A. M. Liljencrantz.

Westmoreland & Fayette.—This company elected officers as follows, in Pittsburgh, Jan. 12: President, W. C. Quincy; Directors, John Newell, David Hostetter, James I. Bennett, M. W. Watson, James M. Bailey, G. T. Rafferty.

Woodruff Sleeping & Parlor Car Co.—The following changes are announced to take effect Feb. 1:

"The Bee Line, Indianapolis & St. Louis, Pittsburgh & Lake Erie, Grand Rapids & Indiana, and St. Louis, Keokuk & Northwestern roads will be operated as the Cleveland Division, C. W. Hall Superintendent, headquarters at Cleveland, O. The Chicago & Eastern Illinois, Evansville & Terre Haute, Indianapolis, Peru & Chicago, Indiana, Bloomington & Western and Wabash roads will be operated as the Chicago Division, F. H. Crane Superintendent, with headquarters at Chicago. Mr. Hall, in addition to his duties as Superintendent of the Cleveland Division, will be Inspector of all cars on both divisions. Mr. Crane, on account of

location, will have charge of all extra cars for special service."

PERSONAL.

—Mr. John Hodge has resigned his position as Master Car-Builder of the Texas & Pacific Railroad.

—Mr. P. W. Coyle has resigned his position as General Passenger Agent of the Lackawanna & Pittsburgh road.

—Ex-Gov. Leland Stanford, for many years President of the Central Pacific Co., has been elected United States Senator for California.

—Mr. M. S. Belknap has resigned his position as Superintendent of the Mobile & Montgomery Division of the Louisville & Nashville road, to date from Feb. 1, next.

—Mr. James N. Scatcherd, a prominent lumber merchant of Buffalo, died in that city Jan. 18. He was for several years a director of the Buffalo, New York & Philadelphia Co.

—Mr. Wm. C. Kingsley has resigned his position as a trustee of the New York & Brooklyn Bridge. He has been connected with the bridge from the first, and for some time past has been President of the board.

—Mr. Frank Thomson, Second Vice-President of the Pennsylvania Railroad Co., was recently offered the presidency of one of the leading roads running out of Chicago, but has declined the offer, preferring to remain with the Pennsylvania,

—Mr. C. J. Thompson has resigned his position as Master Mechanic of the Lackawanna & Pittsburgh Railroad. Mr. Thompson was for many years connected with the Erie and afterward served as Superintendent of Construction of the Genesee Valley road.

—Mr. Andrew C. Gray, for 31 years past President of the Chesapeake & Delaware Canal Co., died Jan. 10. He was born in Kent County, Del., in 1804, and began life successfully as a lawyer, but much of his active life has been devoted to the affairs of his company.

—Mr. H. A. Little, on Dec. 31, closed his connection with the A. French Spring Co., of Pittsburgh. Mr. Little now represents W. L. Ellis, of New York, General Agent of the Patent Shaft & Axletree Co., of Wednesbury, England. Harry says he will not talk French this spring.

—Mr. James A. Raynor, for many years a shipping merchant in New York, died in this city Jan. 21, aged 57 years. He was a director of the New York, Lake Erie & Western Co. and had formerly been connected with the Michigan Southern & Northern Indiana and the New Orleans, Mobile & Texas roads.

—Mr. W. P. Harris has resigned his position as Superintendent of the First Division of the Louisville & Nashville road, to take effect Feb. 1. Mr. Harris was at one time Superintendent of the New York & Greenwood Lake road, and was afterward Superintendent of the Huntington Division of the Chesapeake & Ohio, from which line he went to the Louisville & Nashville.

—Mr. Harrison Tweed, a prominent citizen of Taunton, Mass., died very suddenly in that city Jan. 18. He had served for several years in the State Senate and as a member of the Governor's Council. Mr. Tweed was a large stockholder and a director in the Taunton Locomotive Works, and was an officer of that company for a number of years. He was also a director in a number of other manufacturing concerns.

—Mr. C. R. Mason, the Virginia railroad contractor, whose death was briefly noticed last week, served during the war as Captain of the Pioneer Corps of Jackson's Division, and was generally known in the Confederate army as "Stonewall Jackson's Bridge Builder." He was noted for his energy, decision and perseverance. The story is told of him that on one occasion he had orders to rebuild an important bridge which had been destroyed on the line of Jackson's advance. The General told him that as soon as possible the Chief of Engineers would hand him the plans for the bridge. Next morning the General met Capt. Mason and asked him anxiously whether he had received the plans yet. "General," replied he, "I don't know whether the picture is ready or not; the bridge is done."

TRAFFIC AND EARNINGS.

Cotton.

Cotton movement for the week ending Jan. 16 is reported as follows:

	1885.	1884.	Inc. or Dec.	P.c.
Interior markets:				
Receipts	66,537	46,759	I. 19,778	42 1
Shipments	82,463	79,590	I. 2,873	3.6
Stock, Jan. 9	304,859	360,715	D. 55,856	15.5
Seaports:				
Receipts	130,951	110,467	I 20,484	18.6
Exports	165,095	140,822	I. 24,273	17.2
Stock, Jan. 16	945,611	1,159,027	D. 213,416	18.4

The total movement from plantations for the cotton year (from Sept. 1) to Jan. 16 is estimated at 4,717,153 bales; the increase, as compared with last year, is 142,505 bales, the decrease from 1882-83 is 189,642 bales, and the increase over 1881-82 is 319,625 bales. The weather generally last week was not favorable to a free movement from plantations.

Coal.

Coal tonnages for the week ending Jan. 10 are reported as follows:

	1885.	1884.	Inc. or Dec.	P.c
Anthracite	491,367	307,701	I. 83,666	27.2
Eastern bituminous	134,215	138,002	D. 3,787	2.7
Coke	37,480	48,140	D. 10,660	22.2

The anthracite production is limited by the new agreement, under which only 1,500,000 tons should be shipped in January.

Actual tonnage passing over the Pennsylvania & New York road in December, the first month of its fiscal year, was:

	1884.	1883.	Decrease.	P.c.
Anthracite	111,456	132,697	21,241	16.0
Bituminous	19,367	29,864	10,497	35.0
Total	130,823	162,561	31,738	19.4

The directors of the Pennsylvania Railroad Co., at a meeting held last week, unanimously adopted the following:

"*Resolved*, That while the board of directors of the Pennsylvania Railroad Co. hereby express their desire that the anthracite interests of the said company should be managed in harmony with similar interests of other companies, they believe that neither the general interests of the public nor those of the shareholders of the Pennsylvania Railroad Co. could properly be protected or advanced by this company joining in any restrictive policy in the management of any part of its business."

A meeting of representatives of the other anthracite companies was held in New York, Jan. 19, at which Messrs. E. P. Wilbur, Joseph S Harris and E. S. Pardee were appointed a committee to confer with the officers of the Pennsylvania Railroad Co. and report to an adjourned meeting on Jan. 26. Meanwhile the agreement of the companies is to continue in force until further notice.

Cumberland coal shipments for the week ending Jan. 17 were 28,346 tons. The total shipments this year to Jan. 17 were 79,325 tons; last year, 82,528; decrease, 3,203 tons, or 3.9 per cent.

Shipments of coal from Nova Scotia mines for the year were: 1884, 1,279,372; 1883, 1,297,000; decrease, 17,628 tons or 1.4 per cent.

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

	1884.	1883.	Inc. or Dec.	P c.
Year ending Dec. 31:				
Ala. Gt. South.	$1,155,136	$1,071,829	I. $83,307	7.8
Atch., T. & S. F.	16,339,540	15,909,440	I. 430,100	2.7
Boston, Hoosac Tun. & W.	447,051	343,115	I. 103,936	30.3
Char., Col. & A.	776,746	828,901	D. 52,155	6.3
Cin., N. O. & T. P.	2,592,879	2,596,195	D. 3,316	0.1
Cleve., Ak. & C.	477,937	523,863	D. 46,026	8.8
Col. & Greenville.	688,961	737,897	D. 48,936	6.6
Des M. & Ft. D.	354,029	341,934	I. 12,095	3.5
Fla. Ry. & N. Co.	983,322	964,993	I. 18,329	1.9
Ft. Worth & D.	459,252	386,898	I. 72,354	18.7
Gulf, Col. & S. F.	1,764,835	2,124,440	D. 359,605	17.0
Marq., H. & O.	820,568	900,259	D. 79,691	8.8
Nash., C. & St. L.	2,358,682	2,328,894	I. 29,788	1.3
Net earnings	1,015,739	1,058,292	D. 40,553	4.4
N. O. & Nor'east.	532,925	176,919	I. 356,006	201.2
Ohio & Miss.	4,033,354	4,524,360	D. 491,006	10.8
Rich. & Dan.	3,873,724	3,845,152	I. 28,572	0.7
Texas & St. L.	1,036,037	.....	.....	....
Tol., Ann Arbor & N. M.	239,415	201,124	I. 38.291	19.0
Vicksburg & Mer.	504,660	527,450	D. 22,790	4.3
Vicks., Shreve. & Pacific	291,666	139,700	I. 159,966	108.7
Virginia Midland.	1,590,099	1,686,192	D. 96,093	5.7
Wab., St. L. & P.	16,696,381	16,908,463	D. 212,082	1.2
Western N. C.	440,122	382,037	I. 58,085	15.3
Wis. Central.	1,434,126	1,446,730	D. 12,604	0 8
Eleven months ending Nov. 30:				
Bur., C. R. & No.	$2,508,008	$2,585,565	D. $77,557	3.0
Net earnings	774 553	800,939	D. 26,386	3.3
Central Pacific	20,498,544	22,875,961	D. 2,377,417	10.4
Net earnings	6,059,633	8,584,552	D. 2,524,919	29 4
Cin., Ind., St. L. & Chic	2,231,687	2,305,429	D. 73,742	3.2
Net earnings	832,722	846,795	D. 14,073	1.6
Des M. & Ft. D.	324,596	310,218	I. 14,378	4.6
Net earnings	95,374	83,642	I. 11,732	14 0
Mobile & Ohio.	1,875,775	1,977,396	D. 101 621	5.1
Net earnings	443,047	602,501	D. 159,454	26.4
Utah Central.	962.618	1,081,268	D. 118,648	10.9
Net earnings	447,025	559,138	D. 112.113	20.1
Month of November:				
Bur., C. R. & No.	$274.132	$308,200	D. $34,068	11.1
Net earnings	106,362	133,234	D. 26.872	20.2
Central Pacific	1,832,410	2,104,638	D. 272,228	12.9
Net earnings	590,155	800,731	D. 210,576	26.3
Cin., Ind., St. L. & Chi	196,312	211,264	D. 14,952	7.1
Net earnings	71,603	71,868	D. 265	0.4
Des M. & Ft. D.	33,734	34,117	D. 383	1 1
Net earnings	9,584	7,749	I. 1,835	2.4
Mobile & Ohio	253,332	280,062	D. 26,730	9.5
Net earnings	113,766	138 729	D. 24,963	18.0
Oregon & Cal.	90,700	114,174	D. 13,474	11.8
Net earnings	28,748	52,458	D. 23,710	45.6
Utah Central.	94,105	107,267	D. 13,162	12.3
Net earnings	49,698	56,315	D. 6,617	11.8
Month of December:				
Ala. Gt. South.	$147,375	$108,995	I. $38,380	35.2
Atch., T. & S. F.	1,282,739	1,312,739	D. 30,000	2.3
Boston, Hoosac Tun & W.	35,031	30,448	I. 4,583	15.2
Char., Col & A.	83,096	77,914	I. 5,182	6 7
Cin., N. O. & T. P.	230.169	234,687	D. 4,518	1.9
Cleve., Ak. & Col.	34,236	33,816	I. 420	1.2
Col. & Greenville.	82,590	65,570	I. 17,020	25.8
Denver & R. G. Western	97,444	67.802	I. 29,642	43 6
Des M. & Ft. D.	29,435	31,716	D. 2,281	7.1
Fla Ry. & N. Co.	104,985	108,950	D. 3,965	3.6
Ft. Worth & D.	25,289	31,271	D. 5,982	19.3
Georgia Pacific.	71,876	58,883	I. 12,993	22.0
Gulf, Col. & S. F.	144,588	195,623	D. 51,035	26.0
Marq., H. & Ont.	20,910	21,127	D. 217	1.0
Nash., C. & St. L.	197,512	209,999	D. 12,487	59 5
Net earnings	84,759	94,171	D. 9,412	10.0
N. O. & Nor'east.	93,154	56,932	I. 36,222	63.6
Ohio & Miss.	314.907	361.022	D. 46.115	12.8
Rich. & Dan.	366,710	334,640	I. 32,070	9.6
Texas & St. L.	121.358	103.625	I. 17,733	17 1
Tol., Ann Arbor & N. M.	23,500	19,598	I. 3,902	19.8
Vicksburg & Mer.	62,793	66,753	D. 3,960	5.9
Vicks., S. & P.	55,550	20,357	I. 35,193	172.5
Va. Midland	115.614	118,443	D. 2,829	2.3
Wab., St. L. & P.	1,448,383	1,518 287	D. 69,904	4.6
Western N. C.	37,246	33,784	I. 3,462	10 2
Wisconsin Cent.	127,991	117,798	I. 10,193	8 6
Second week in January:	1885.	1884.		
Canadian Pac.	$87,000	$64,000	I. $23,000	25.9
Chi. & Alton	172,380	175,625	D. 3,245	1.8
Chi. & East. Ill.	23,424	33,139	I. 285	0.8
Chi., Mil. & St. P.	362,000	345,603	I. 16.397	4.7
Chi. & Nor'west.	381,600	317,800	I 63,800	20.1
Chi., St. P., M. & Omaha	78,200	80,900	D. 2,700	3.3
Cin., Ind., St. L. & Chicago	46,091	38,676	I. 7,415	19.0
Long Island	38,710	34,014	I. 4,696	13.6
Louis. & Nash.	271,530	207,230	I. 64,300	31 0
Mil., L. S. & W.	18,525	16,300	I. 2,225	13.8
Roch. & Pitts.	19,701	15,400	I. 4,301	27.9
St. L. & San Fran.	82,100	66,600	I. 15.500	23.3

Weekly earnings are usually estimated in part, and are subject to correction by later statements.

Montana Stock Traffic.

The Northern Pacific Railroad shipped west to Montana last year 98,219 head of young cattle, against 15,000 head in 1883. The number of beef cattle shipped east in 1884 from Montana was 75,600 head, against 34,883 in 1883. Twenty-thousand sheep were also shipped East in 1884 from Montana. In 1884 there were 250,000 head of two and three-year-old cattle driven from Texas to Montana. The wool clip of Montana last season was 2,794,000 pounds.

California Through Freights.

Shipments of through freight eastward from California points in November were:

	Tons.	P. c. of total.
Central Pacific	4,737	49.3
Southern Pacific	4,872	50.7
Total	9,609	1000.0

The shipments were light, being 46 per cent. less than in October. Leading items of freight were 1,218 tons sugar, 828 tons wine, 674 tons wool and 466 tons beans.

New York Milk Rates.

The roads running to New York on the west side of the Hudson River have given notice that after Jan. 26 the rate on milk to New York will be increased from 27½ to 32 cents per 10-gallon can. This rate is for delivery at the terminal station—Jersey City, Hoboken or Weehawken—and does not include transportation across the river. The rate on the New Jersey Central and the Lehigh Valley (which carry comparatively very little milk) will be 28 cents.

The Transportation of Explosives.

The Massachusetts Railroad Commission recently issued the following circular to the railroad companies of the state:

"The attention of the Board has been called to the need of greater care in regard to the laws relative to the transportation of high explosives and to the rules made by the Board in pursuance of those laws.

"We are informed that the dynamite which recently caused a terrible explosion in a New Hampshire town was transported, in violation of the statute and of all the laws of prudence, in the train of a Massachusetts railroad and in the care of an express company. Neither the employés of the railroad nor of the express company were guilty of any wrong or of any carelessness. They were all misled by the recklessness of the person who smuggled the dangerous article into the car and imperiled the lives of all persons in the train.

"The terrible results that followed the careless handling of this explosive, while they preclude any idea of enforcing the law against this offender, illustrate the danger to every person on the train by which the article was conveyed, without any warning given or precaution taken.

"It seems desirable to call the attention of all managers of railroad companies to the law and rules regulating the transportation of explosives. The penalties provided are severe, being fines not exceeding $5,000, and confinement in the state prison not exceeding five years. But they are not too severe when it is considered what enormous danger is created for innocent passengers by reckless persons who wish to avoid a slight expense or secure a slight convenience. And it is the duty of all persons connected with railroad companies not only to exercise diligence as to transportation of explosives, but also, whenever the law is violated, to bring the offender to justice for the protection of the public."

Anthracite Coal Tonnage in 1884.

Anthracite tonnage, as given by the report of Mr. John H. Jones, the Official Accountant, was as follows for December and the year ending Dec. 31, the statement including the entire production of anthracite coal, excepting that consumed by employés, and for steam and heating purposes about the mines:

	December.		Year.	
	1884.	1883.	1884.	1883.
Phila. & Reading	881,748	754,918	11,163,920	12,232,402
Lehigh Valley	505,271	422,571	5,935,254	6,271,773
Del., Lack. & Western.	476,376	370,704	5,204,362	5,079,123
Del. & Hud. Canal Co.	295,174	223,965	3,362,680	3,512,971
Pennsylvania R. R.	242.115	215 794	8,169,287	2,773,419
Pennsylvania Coal Co.	131,010	108,975	1,397,546	1,541,145
N. Y., L. E. & W.	99,034	36,290	484,844	382,194
Total	2,630,737	2,133,247	30,718,293	31,793,027

Increase for the month, 497,490 tons, or 23.3 per cent.; decrease for the year, 1,074,734 tons, or 3.4 per cent.

New Jersey Central tonnage is included with the Reading in both years. The Lehigh Valley includes the State Line & Sullivan tonnage, which was 85,394 tons for the year. In addition to the tonnage above, the Delaware & Hudson Canal Co., transported from mines 105,515 tons in December and 623,697 for the year, which is included in tonnage of other interests.

The stock of coal on hand at tidewater shipping points, Dec. 31, 1884, was 874,681 tons; on Nov. 30, 712,392 tons; increase, 162,289 tons. The amount on hand Dec. 31, 1883, was 748,330 tons, showing an increase in stock at the close of the year of 126,351 tons (16.8 per cent.) over last year.

The percentage of the tonnage credited to each company for the year was as follows:

	1884.	1883.	Inc. or Dec.
Philadelphia & Reading	36.3	38.5	D. 2.2
Lehigh Valley	19.3	19.7	D. 0.4
Delaware, Lackawanna & Western	16.9	16.0	I. 0 9
Delaware & Hudson Canal Co.	11.0	11.1	D. 0.1
Pennsylvania Railroad Co.	10.3	8.7	I. 1.6
Pennsylvania Coal Co.	4.6	4.8	D. 0.2
New York, Lake Erie & Western	1.6	1.2	I. 0.4
Total	100.0	100.0	

The marked changes here are the gains made by the Pennsylvania Railroad and the Lackawanna, and the loss of the Reading. The changes of the other companies are unimportant.

The division of the output between the three great districts of the anthracite region was:

	1884		1883.	
	Tons.	Per ct.	Tons.	Per ct.
Wyoming	15,677,753	51.0	15,604,402	49.1
Lehigh	5,562 226	18 1	6,113,809	19.2
Schuylkill	9,478.314	30.9	10.074,726	31.7
Total	30,718,393	100.0	31,793,027	100.0

Eastern competitive tonnage, including all coal which, for final consumption or in transit, reaches any point on Hudson River or the Bay of New York, or which passes out of the capes of the Delaware, was:

	1884.	1883.	1882.
Tons	12,009,855	13,148,185	12,018,764
Per cent. of total output	39.1	41.4	41 3

This decrease in tide-water tonnage indicates an increase in the movement westward, as the amount consumed along the lines of the roads for iron and other manufacturing purposes was certainly less than in 1883.

Transcontinental Traffic Association.

At a meeting of the Transcontinental Association in San Francisco Jan. 16 the Northern Pacific Co. asked for an additional share in the division of gross receipts A compromise was attempted but was refused.

A dispatch from San Francisco, Jan. 18, says: "The Transcontinental Association has finally decided upon the following agreement: The southern lines are to pay the northern lines 8 per cent. of their gross earnings on through business, and the northern lines are to pay the southern a like percentage of their gross earnings on through business. The northern lines comprise all the roads in the association that are feeders to the Oregon Railway & Navigation Co., and the southern are those in the association that feed the Central and Southern Pacific roads. This arrangement will leave a balance in favor of the northern roads, which they accept as better terms than the 6 per cent. of the gross earnings of the southern roads formerly paid them for non-interference in California traffic."

Colorado-Utah Association.

A despatch from Denver, Col., Jan. 15, says: "At a meeting of the general managers of the roads represented in the Colorado pool held here about three months ago the award of percentages made by Arbitrator Tucker was announced. This afternoon Pool Commissioner Daniels announced another award, which will govern until May 1. The Union Pacific loses 2 per cent. on Denver freight business by the

new award, and the Burlington and Santa Fé roads gain 1 per cent. each. The new figures are: Union Pacific, 47 per cent.; Burlington, 30 per cent., and Santa Fé, 23 per cent."

Passenger Rates.

The Pennsylvania Railroad Co., for the first time, has taken part in the war on west-bound passenger rates by instructing its agents in New York to sell emigrant tickets to Chicago, Cincinnati and St. Louis at the uniform rate of $1. In common with the first-class rates, emigrant rates have been unsettled for some time, and the regular fare of $13 from New York to Chicago has been reduced gradually to $8, nominally, although it is said that even the $8 rates have not been maintained. No other road has as yet met this cut, except the West Shore. The $1 emigrant tickets are sold only at the Castle Garden office.

No new cutting is noted in first-class passenger rates, and the Pennsylvania still maintaines its full rate of $20 from New York to Chicago, as it has done all along.

East-bound Freight Rates.

Chicago dispatches report that east-bound freight rates are not maintained, and that grain shipments to New York are taken at 20 cents per 100 lbs. The Pennsylvania Co., it is said, is not at present joining in the reduction, its agents not having received any instructions regarding the matter.

RAILROAD LAW.

The Richardson Safety-Valve Patent.

A dispatch from Washington, Jan 19, says: "A decision was rendered by the Supreme Court of the United States to-day in the two patent cases of the Consolidated Safety-Valve Co., of Hartford, appellant, *vs.* the Crosby Steam Gauge & Valve Co.—Appeals from the Circuit Court for the District of Massachusetts. These were suits brought by the appellant against the appellee for alleged infringement of two patents granted to George W. Richardson, Sept. 25, 1866, and Jan. 19, 1869, for certain improvements in safety valves. The defense set up by the Crosby Co. was want of novelty in Richardson's alleged inventions. The court below held the defense good, and dismissed the Consolidated Co.'s bill of complaint, on the ground that Richardson's patents were invalid. This Court reverses that decision, and holds that Richardson's inventions had not been anticipated by others, and that he was 'the first person who made a safety valve which, while it automatically relieved the pressure of steam in the boiler, did not, in effecting that result, reduce the pressure to such an extent as to make the use of the relieving apparatus practically impossible, because of the expenditure of time and fuel necessary to bring up the steam again to the proper working standard.' His patents are held by this court to be valid, the valves made by the Crosby Co. are declared to be infringements, and the decrees of the Circuit Court are reversed, with directions to award an account of profits and damages on the patent, whose term has expired since this suit began, and to award a perpetual injunction on the other patent. Opinion by Justice Blatchford."

OLD AND NEW ROADS.

Addison & Northern Pennsylvania.—The extension of this road from Gaines, Pa., to Pike Mills was completed Dec. 31, with the exception of a bridge which trains must cross to reach the station at the new terminus. The extension is 5 miles long, making the total length of the road from Addison, N. Y., to Pike Mills 46 miles.

Anniston & Attalla.—The line of this projected road has been finally located and contracts for the construction of the road will shortly be let. The line extends from Anniston Ala., northwest 40 miles to Gadsden, from which point there is a completed line 5 miles long to Attalla on the East Tennessee, Virginia & Georgia road. The line runs through an excellent mineral country, both coal and iron ore being abundant.

Atchison, Topeka & Santa Fe.—The Magdalena Branch of this road has been completed and opened for business. It extends from Socorro, N. M., westward to Magdalena, 28½ miles.

Atlantic & North Carolina.—An effort is being made to induce the North Carolina Legislature, at its present session, to make some provision for the extension of this road westward. The road runs from Morehead City to Goldsboro, and three years ago its extension was begun by the Midland North Carolina Co. That company, however, failed after building 22 miles, from Goldsboro to Smithfield, and nothing further has been done. The proposition now made is that the state shall give its stock in the company (in which it owns about two-thirds interest) to any one who will agree to build the extension from Smithfield to Salisbury, and that it shall also give the labor of a number of convicts from the state penitentiary for the same purpose.

Bradford, Bordell & Kinzua.—The last coupon due on the $500,000 first-mortgage bonds of this company has not been paid, and at the annual meeting last week it was stated that the New York, Lake Erie & Western Co., which controls the road, has declined to advance the money. No action was taken in relation to the default, and probably none will be at present.

Buffalo, New York & Philadelphia.—At the annual meeting last week, the proposed plan of adjustment of this company's difficulties by the funding of coupons on certain of the bonds and the assessment of the stock was approved, and resolutions passed authorizing the company to make the necessary issue of bonds and scrip.

California Southern.—Holders of over $2,900,000 out of the $3,100,000 bonds of this company have consented to the conversion of their bonds into income bonds, and to the issue of new first-mortgage bonds as proposed, and the transfer of the road to the Atchison, Topeka & Santa Fé. The holders of the remaining bonds, however, show a disposition to hold out, and it is probable that a foreclosure and sale of the road will be necessary to carry out the proposed reorganization.

Central of Georgia.—It is said that this company will make a general reduction of 10 per cent. in wages of its employés, to take effect Feb. 1 next.

Central Iowa.—The non-payment by the company of the January coupons, which were due Jan. 15, was explained by the following statement of Russell Sage, Vice-President of the road: "The coupons of the Central Iowa road, due to-day, are being paid and purchased by the Mercantile Trust Co. Those purchased will be repaid and canceled from the first earnings of the road until they are all paid, as have been the previous coupons on the same class of bonds. The directors are arranging a plan for paying one-half of four coupons on the divisional bonds, which are converted into consolidated bonds, in cash, the other half to be funded into said consolidated bonds. This will free the company from its floating debt and enable it to complete the building of the bridge across the Mississippi River at Keithsburg. With estimated earnings of the present and coming year, interest will easily be paid as it matures. The small deficiency that has accrued has been in consequence of the loss of crops in the last two years and the light earnings in consequence of the same; also the light earnings on the divisions of the road for two years. Earnings, however, are improving, and we believe that everything will go on smoothly in the future."

Central of New Jersey.—The Dinsmore suit to set aside the lease of this road to the Reading, which has been, it was supposed, finally settled, has been revived by an appeal to the United States Supreme Court. The necessary bonds were filed in Philadelphia, Jan 16, and the appeal certified to the Supreme Court by the Circuit Court.

Central Pacific.—This company's statement for November and the eleven months to Nov. 30 is as follows:

	—November.—		—Eleven months.—	
	1884.	1883.	1884.	1883.
Earnings	$1,832,410	$2,104,638	$20,498,544	$22,875,961
Expenses	1,242,255	1,303,907	14,438,911	14,291,409
Net earnings	$590,155	$800,731	$6,059,633	$8,584,552

The eleven months show a decrease in gross earnings of $2,377,417, or 10.4 per cent.; an increase in expenses of $147,502, or 1.0 per cent., and a resulting decrease of $2,524,919, or 29.4 per cent., in net earnings.

Chicago & Great Southern.—It is reported that a syndicate has been formed to buy this bankrupt road and extend from its present northern terminus at Yeddo, Ind., northeast about 30 miles to La Crosse, the southern terminus of the Chicago & West Michigan road. This connection, it is expected, will give some value to the line.

Cincinnati & Eastern.—Several petitions have recently been filed by the bondholders of this company requesting the courts to permit no further issue of receiver's certificates. A hearing was recently had of these petitions, and by general consent an order will be issued during the present term of court for the sale of the road.

The Receiver reported to the court that he had been authorized to issue $310,000 in certificates, and of these $235,000 had been used in completing the road to Portsmouth and in making arrangements to change the older portion to standard gauge. The Receiver placed the total indebtedness, including bonds, certificates and floating debts at $1,994,000.

Cincinnati, Indianapolis, St. Louis & Chicago.—This company's statement for November and the five months of its fiscal year from July 1 to Nov. 30, is:

	1884.	1883.	Inc. or Dec.	P.c.
Earnings	$196,312	$211,264	D. $14,952	7.1
Expenses	124,444	139,661	D. 15,217	10.9
Net earnings	$71,868	$71,603	I. $265	0.4
Fixed charges	50,000	50,083	D. 83	0.2
Surplus, Nov	$21,868	$21,520	I. $348	1.6
Surplus to Oct. 31	163,231	163,068	I. 163	0.1
Total surplus, 5 ms.	$185,099	$184,588	I. $511	0.3

The earnings above shown are from transportation only. Earnings derived from grain elevator, coal elevator, rents, and other miscellaneous sources, are credited at the end of each six months direct to profit and loss account.

Cincinnati, New Orleans & Texas Pacific.—A meeting of the stockholders was held in Cincinnati, Jan. 17, for the purpose of receiving the report of the investigating committee appointed at the last meeting. This committee presenting a report setting forth at considerable length the expenditures made on the road by the company and the disposition made of the amount paid in by the subscribers for the stock. The committee says that the company has been much embarrassed by the failure of the trustees to provide proper terminal facilities in accordance with the contract, and also by the fact that the road when received from the trustees was in poor condition, and required a much larger expenditure of money than had been expected. In conclusion, the committee stated that their items, amounting to about $300,000, for expenses incurred in connection with the lease of the Cincinnati Southern road from the city of Cincinnati and with the organization of the company, which required explanation which they were unable to give.

This portion of the report called out a very sharp discussion, but this failed to bring out any information on the disputed point. The meeting finally adjourned without taking any action.

Cincinnati, Wabash & Michigan.—This company, it is said, is making arrangements to build this spring an extension of the road from the present terminus at Anderson, Ind., southward 22 miles to a junction with the Indiana, Bloomington & Western, 6 miles east of Indianapolis. The road will thus secure southern connection and a line of its own to Indianapolis, which it has hitherto lacked.

Cleveland & Western.—This company has been organized for the purpose of buying the Cleveland, Delphos & St. Louis road, which is shortly to be sold under foreclosure, and completing that road from its present terminus eastward to Akron, Ohio. The incorporators are chiefly bondholders of the old company.

Columbia & Puget Sound.—The Seattle (Wash. Ter.) *Intelligencer* says: "This company, during the year, has graded 13 miles of road and laid 11½ miles of track on the Cedar River Extension, which now reaches beyond the Black Diamond mine, and would have been completed to the Franklin colliery by to-day, had not the recent snowstorm put a stop to the progress of the work. This company has also built three-fourths of a mile of road along the city front. On the old line, running to Newcastle, new trestles have been built, the largest one to replace the old Lake trestle. A new bridge has been built across Cedar River at Renton, a new trestle built at Coal Creek and the old road has been mostly retied. The total cost of the Cedar River Extension, together with improvements and repairs to the old road, has been about $200,000. The company will in a few weeks build new coal bunkers or chutes to the south of the present incline, so that four vessels can be taking cargo at the same time."

East Tennessee, Virginia & Georgia.—The Atlanta (Ga.) *Constitution* of Jan. 17, says: "The East Tennessee Railroad suit is now in a very interesting shape. At the same time the suit stands a fair chance to be compromised. It will be remembered that Judge Estes passed an order removing the case to the United States Court. A bill of exceptions has been filed to that and served, and a supersedeas has been granted. The case will be taken to the Supreme Court. On the other hand, the copy of the proceedings of removal has been filed in the United States court, and the attorneys who represent Major Fink have notified the opposite side that on Monday they will apply to Judge Boarman for an injunction to dissolve the order appointing Judge Dorsey. Thus it is seen that there is a chance for the Supreme Court of Georgia and the United States Court to pass upon the matter, and possibly cause a clash."

This company has put on a double daily line of Pullman cars between Cleveland, Tenn., and New Orleans, running in connection with the through trains from New York by way of the Pennsylvania, the Shenandoah Valley and the Norfolk & Western, and making a line between New York and New Orleans with only one change of cars, at Cleveland.

Florida Railway & Navigation Co.—The Leesburg Branch of this company's road is now completed to Tavares, in Orange County, Fla., 10 miles eastward from the late terminus at Leesburg, and 22 miles from the junction with the Southern Division at Wildwood. The new line runs through a thickly settled section, which is considered one of the best orange districts in the State.

Forth Worth & Denver City.—It is announced that work will be begun at once on the extension of this road from its present terminus at Wichita Falls, Tex., northwest 50 miles to a point in Wilberger County. The extension is made to retain the stock traffic of the road, as the present terminus at Wichita Falls is now surrounded by enclosed farming lands and the stockmen no longer have free access to the road.

Greenville & Laurens.—An agreement has been made for the consolidation of this company with the Midland, of South Carolina, a new company just chartered. The Greenville & Laurens Co. has graded 38 miles of road between the two towns named, and has also some cash in hand. The agreement is understood to be that track shall be laid as soon as possible by the new company. The Midland Co. is chartered to build a road from Charleston by the shortest practicable line to Columbia and thence to Greenville. It purposes also extending its road to Asheville, N. C., and thence to some point on the East Tennessee road.

Gulf, Colorado & Santa Fe.—It is reported that negotiations are in progress for the transfer of this road to the Atchison, Topeka & Santa Fe Co.; whether by lease, purchase or transfer of a controlling interest, is not announced. The transfer will necessarily involve the extension of the road to a connection with the Atchison, Topeka & Santa Fe line. Probably this extension will be made across the Indian Territory to some point in Southern Kansas. The Gulf, Colorado & Santa Fe has already authority from the government to build a line across the Indian Territory.

A Boston dispatch says that these reports have no foundation except in the fact that both companies want to build a line across the Indian Territory, and that some arrangement with regard to these lines is possible.

Herkimer, Newport & Poland.—At a meeting held in Newport, N. Y., Jan. 15, the stockholders voted to increase the capital stock from $120,000 to $250,000, provided the consent of the Railroad Commissioners is obtained. Of the new stock, $80,000 will be applied to improvements of the road and new equipments, and $50,000 will be reserved to pay off the outstanding bonds of the company.

Houston & Texas Central.—Mr. C. P. Huntington has made a statement regarding the default of this company, in which he says that the Southern Development Co., in November, 1884, acquired a majority of the Houston & Texas Central stock, with its purchase of the Morgan's Louisiana and Texas property. The Houston & Texas Central Co. did not earn enough to pay its July, 1884, coupons on the first mortgage, and the Southern Development Co. loaned $325,000 to the Houston & Texas Central Co. to meet the interest, the Houston & Texas Central expecting to repay the loan from the earnings of the latter half of the year; the company was, however, disappointed in this respect, and of the $325,000 loaned only $70,000 have been repaid. Mr. Huntington says further, that after inquiring into the Houston & Texas Central's affairs, he became fully convinced that not only had the road not earned its interest falling due Jan. 1, 1885, "but that, under the circumstances, it could not be reasonably expected that the railway company would be able to make provision for the large interest charge annually accruing against it." Under these circumstances, Mr. Huntington made arrangements in December with the Southern Development Co. to purchase the coupons due Jan. 1, 1885, purely as a matter of convenience to the holders. "Every pains was taken, as I am informed, to advise coupon holders that the interest had not been earned, that the railway company had not sufficient credit to enable it to borrow the money, and that the coupons were being purchased and not paid. If any person has sold his coupons to the Southern Development Co., through inadvertence or mistake, that company has not hesitated in any instance upon the repayment of the money to return the coupons."

The company has furnished the following statement to the bondholders' committee for the year ending Dec 31:

	1884.	1883.	Inc. or Dec.	P. c.
Earnings	$2,580,545	$3,251,875	D. $671,330	20.7
Expenses	2,419,436	2,588,957	D. 169,521	6.5
Net earnings	$161,109	$662,918	D. $501,809	75.6
Interest	1,207,820	1,233,897	D. 26,077	2.1
Deficit	$1,046,711	$570,979	I. $475,732	83.3

In this statement the earnings and expenses for December are partly estimated.

Indiana, Bloomington & Western.—This company gives notice that on Jan. 18 it withdrew all through passenger trains from its St. Louis Division, and will hereafter run only local accommodation trains between Indianapolis and Decatur. The St. Louis business formerly done over this division by way of Decatur will hereafter be done over the main line, through passengers being transferred to the Wabash road at Danville. It is understood that the operation of the St. Louis Division, has not been profitable, and the company has decided to use it for local business only hereafter, limiting the train service to the amount of business offered.

Indianapolis, Decatur & Springfield.—The attention of bondholders is called to the fact that the trustees of the second mortgages are now paying at the Central Trust Co., New York, one half of coupon No. 11, due Jan. 1, 1882, attached to the second mortgage bonds of said company, being $17.50 on each bond. On presentation of the bonds said coupon will thereupon be stamped "half paid." This payment will equalize as to cash payment the bonds which have not been exchanged or converted with those heretofore exchanged.

Indianapolis & Vincennes.—This company completed in December a branch extending from Bushrod, Ind., 34 miles from Indianapolis, southward to Island City, a distance of 4 miles. It is built to reach some coal mines recently opened at Island City.

Jamestown & Franklin.—The lease of this road to the Lake Shore & Michigan Southern Co. expired a year ago, and some efforts were then made to prevent its renewal. The Lake Shore has continued to operate the road under a temporary agreement, and at the annual meeting on Jan. 12 a new lease to continue for five years was ratified.

Lake Erie & Mississippi.—This company has been organized and has made preparations to begin work early in the spring. The projected line is from Bloomington, Ill., to Peoria, 43 miles, and is an extension of the Lake Erie & Western road, which now terminates at Bloomington. The new company issues $1,000,000 of stocks, and $1.000,000 in bonds. The bonds have been taken at about 80 by a syndicate in which it is said Mr. William H. Vanderbilt is largely interested. The road will be leased to the Lake Erie & Western Co. on its completion.

Louisville & Nashville.—This company makes the following statement for the six months of its fiscal year from July 1 to Dec. 31:

Gross earnings	$7,094,093
Expenses (56.21 per cent.)	3,988,065
Net earnings	$3,106,028
Income on investments	52,797
Total	$3,158,825
Interest, rentals, etc	2,442,110
Surplus	$716,715

For the corresponding period in 1873 the surplus was $879,821. The sinking fund payments during the half-year were $423,929, leaving $375,000 to be paid during the six months to June 30 next.

Louisville, New Orleans & Texas.—This company announces that the branch which leaves the main line north of Leland, Miss., and runs westward to a point on the Mississippi River opposite Arkansas City, will be shortly opened for traffic. Connection will be made with the Little Rock, Mississippi River & Texas road at Arkansas City by means of a transfer boat large enough to carry 10 cars. This branch is 22 miles long from the junction with the main line to the river terminus.

Mexican Railroad Notes.—The following notes are from the *Mexican Financier* of Jan. 10:

On Dec. 5 two new lines of tramways were opened in the city of Durango.

The surveys of the proposed railway from Tapachula to San Benito, Chiapas, are now completed. The length will be 18 kilometers.

The provisional freight tariff now in force on the Mexican Central Railroad has been extended two months, until Feb. 28, 1885. Meanwhile the new tariff will be discussed and the opinions of leading business men in regard to it will be listened to and will receive due consideration from the Department of Public Works.

Montgomery Southern.—Negotiations are in progress for the sale of this road to Georgia parties, who propose to extend the road southward. It is now in operation from Montgomery, Ala., southward to Ada, 20 miles; it is of 3-ft. gauge.

Montreal, Portland & Boston.—The Canadian Pacific Co. has secured judgment against this company for $1,500.000 for money advanced. It is understood that proceedings will be taken under this judgment to secure possession of the road.

Nashville, Chattanooga & St. Louis.—This company's statement for December and the six months of the fiscal year from July 1 to Dec. 31, is as below:

	December.		Six months.	
	1884.	1883.	1884.	1883.
Earnings	$197 512	$209.999	$1.213.501	$1,2:6,905
Expenses	112,753	115,828	688.862	649,364
Net earnings	$84,759	$94,171	$524,639	$577,541
Interest and taxes			342 9:2	331,826
Surplus for the half-year			$181,707	$245,715

For the half-year there was a decrease in gross earnings of $13.404, or 1.1 per cent.; a decrease in net earnings of $52.902, or 9 2 per cent., and a decrease in surplus of $64 008, or 26.2 per cent.

New York & Boston Inland.—The Boston *Advertiser*, of Jan. 16, says: "The certificate of the Railroad Commissioners, approving the sworn estimate of the cost of constructing the New York & Boston Inland Railroad, sets forth that capital equal to at least one-half of such cost has been subscribed by responsible parties and that one-fifth of it has been paid in, and that, in the judgment of the board, this is 'sufficient to pay all damages, immediate or consequential, that may be occasioned by the laying out, making and maintaining the railroad or by taking land or material, has been paid in cash to the treasurer and will remain in his hands until lawfully withdrawn.' Quite likely; and being so satisfied, the action of the board is largely perfunctory and carries with it no expression of opinion as to the necessity or prospects for the projected road. The estimate above referred to is that of Mr. William Roteh, Chief Engineer, and is for only a single-track road with 56 lb steel rails. The distance in Massachusetts is 39 miles, and the estimated cost is $999.713, or an average of $25,453 a mile. Mr. George Cook, Treasurer, made affidavit that the capital stock of the company is $500,000, and that 25 per cent. of the par value of each share has been paid in. The charters in Connecticut have expired, and nothing appears to have been done to revive them. If, however, the road is built through Massachusetts, there may be some way discovered of getting through Connecticut, though probably not over any road now leased to the New York, New Haven & Hartford, as somebody has suggested.

"The only possible chance for this road is a first-class double-track road, straighter than any other, with low grades and no grade crossings. Such a road was originally projected. It was for such a road that the charter was granted. It could not be built, probably, for less than $30,000 000. The kind of a road now started will cost, according to the foregoing estimates, only $5,000.000. In competition with the two all-rail lines and the three rail and water lines between the two cities, a new road that is not vastly superior to either will only damage them and not help itself."

New York, Susquehanna & Western.—Testimony is now being taken in the suit brought by R. P. Terbune to set aside the organization of this company, which was formed by the consolidation of the Midland Railroad Co., of New Jersey, with several subordinate companies. The plaintiff claims that the consolidation was effected by voting on 6,000 shares of stock which had been issued in violation of the company's charter, and which had never been legally issued or paid for. Several witnesses examined testified that the affairs of the company since the consolidation had been so mismanaged that it was now on the verge of bankruptcy.

Northern (New Hampshire).—The petition presented some months ago to the directors of this company for a division of its surplus among its stockholders was signed by owners of about one-fifth of the capital stock. The directors have declined to make the division on the ground that the surplus is chiefly invested in the stock and bonds of the Concord & Claremont and the Peterboro & Hillsboro roads, the control of which is important to the company. Should these securities be distributed as asked, they would be divided among a large number of the holders, and might be bought up by rival interests. The petitioners, on the other hand, claim that, as the road is now leased to the Boston & Lowell Co., it is the business of that company to look after these controlled lines, and that they should receive the benefits of their investments. It is understood that they will make up a case to be submitted to the courts.

Northern Pacific.—The contractors of the Cascade division are now at work on the section of 40 miles from New Yakima, Wash. Ter., to Ellensburg. There is some heavy work on this part of the road and it is not expected that it will be finished before July. On this division three lines are now being surveyed through the Stampede Pass, each of which requires a tunnel. It is probable that the line will be adopted that requires the longest tunnel as it is the easiest in other raspects.

Ohio River & Lake Erie.—The construction of this new road from Greenville, Pa., to Erie, along the line of the old canal, has been interrupted by the failure of the subcontractors to pay their men. Officers of the company state that they can do nothing under the terms of the contract, as the general contractor has entire control of the matter.

Oregon & California.—The *Commercial and Financial Chronicle* says: "The first-mortgage bondholders' committee have under consideration the best means of carrying into effect their resolutions of Nov. 14 and 21 for reorganizing the finances of the company. The London & San Francisco Bank (limited) is buying coupon No. 7, due Jan. 1, of the company's first mortgage gold bonds, at 4s. 2d. per dollar. The committee hopes to form a satisfactory plan, but foreclosure proceedings will probably be begun soon."

In Portland, Or., Jan. 19, application was made by counsel for the English bondholders for the appointment of a receiver pending further proceedings. The Court granted the application and appointed R. Koehler and A. G. Cunningham Receivers.

Philadelphia & Reading.—In the United States Circuit Court in Philadelphia, Jan. 16, Henry C. Kelsey, at whose suit the receivers were originally appointed, filed a supplementary bill. The bill, however, is merely formal in order to cover a change in the trustee under the general mortgage.

Mr. Edward S. Whelen, who was chairman of the stockholders' annual meeting, has appointed the committee of seven provided for by the resolution passed at the meeting. It is said that a majority of the committee favor the Gowen plan of reorganization. As the members are somewhat scattered it will be some little time before a meeting can be held. The committee named by Mr. Whelen are Messrs. Charles T. Collis, of New York; George Brooks, of Birdsborough, Pa.; E. J. Dupont, of Wilmington, Del.; William P. Jenks, of Philadelphia; Thomas G. Hood, of Philadelphia; James Duffy, of Marietta, Pa., and John Taylor, of London, England. The committee is to select its own chairman.

The Receivers' statement for November, as audited and reported to the Court shows cash transactions as follows:

	Railroad Co.	Coal & Iron Co.
Cash on hand, Nov. 1	$384,205	$5,021
Receipts from all sources	3,168,356	1,847,273
Total	$3,551,561	$1,852,294
Disbursements	3,356,736	1,836,398
Cash balance, Dec. 1	$194,825	$15,896

It is reported from Philadelphia that several large holders of bonds are not satisfied with the plan of reorganization, but intend to press the movement for the foreclosure of the general mortgage.

Pittsburgh, Fort Wayne & Chicago.—A dispatch from Fort Wayne, Ind., Jan. 19, says: "The brakemen's strike, which was begun here on Tuesday night, terminated last evening. The strikers held a meeting yesterday afternoon and delegated a committee of four to wait on Mayor Zollinger at his residence, which was done. Later the committee waited on Superintendent Law, of the railroad, and at this meeting it was agreed that the company be permitted to run double-header freight trains if desired, while those of the striking brakemen who choose to work will be reinstated by the company and not be discharged for their participation in the strike. It is understood that Mayor Zollinger promised to use his influence to the end that the warrants which were sworn out for the arrest of strikers be not served, and that the company will not push the matter. The chairman of the strikers' committee says that the strike was given up because members of the organized lodges of conductors and engineers who had urged the brakemen to strike, and who gave them promise of moral and financial support, failed to do as they had agreed.

"It is a matter of some surprise to the public to learn that upon Tuesday, the first day of the strike, there were, as stated by the chairman of the strikers, but 6 of the strikers, on the day following but 11, and at no time has their number exceeded 30; but they claim, as had been heretofore stated, that they could have called several hundred outside workmen to their aid if they had so desired."

Portland & Willamette Valley.—This company has been organized to build a railroad from Portland, Oregon, southward to Dundee, about 30 miles. The object of the road is to make an outlet to Portland for the Oregonian Railway, which has now no connection with that city.

Reading & Pottsville.—In the court at Pottsville, Pa., Jan. 19, the suit of the People's Railway Co., to enjoin the construction of the proposed Reading & Pottsville road into the town of Pottsville on the line located, was decided in favor of the defendant. This disposes of the last of the injunction cases against the new road and leaves no legal obstacle to its construction. The new line when built will connect Pottsville with the Pennsylvania Railroad's new Reading branch.

Richmond & Alleghany.—A general meeting of first mortgage bondholders has been called, to be held in New York Jan. 23. It is stated in the call for the meeting that all negotiations for a settlement have failed, and that the meeting is to consider what can be done to secure the rights of the bondholders.

St. Andrews Bay & Alabama.—It is proposed to build a railroad from St. Andrews Bay, Fla., northward into Alabama, the northern terminus to be probably at Montgomery. The principal advocate of the proposed line is D. C. Aldrich, of Chicago, who is a large owner of pine lands on the projected line.

Securities on the New York Stock Exchange.—The Governing Committee of the New York Stock Exchange has placed the following new securities on the lists:

Albany & Susquehanna, $2,000,000 first consolidated 6 per cent. bonds; making the total amount listed $5,000,000.

Chicago, Burlington & Quincy, 69,578 shares additional stock; making the total number of shares listed 765,400.

Milwaukee, Lake Shore & Western, $1,015,000 Michigan Division first mortgage 6 per cent. bonds.

Morgan's Louisiana & Texas, $5,000,000 first mortgage 7 per cent. bonds.

Northern Pacific, $938,000 additional general mortgage bonds.

Pittsburgh, Cleveland & Toledo, $2,400,000 first mortgage 6 per cent. bonds.

Pittsburgh Junction, $1,440,000 first mortgage 6 per cent. coupon bonds.

Storm in the Northwest.—The lines west and northwest of Chicago have been pretty badly blocked, for the first time this winter, by a snow storm which began on Jan. 14 and continued for four days. It not only snowed very heavily over a wide extent of country, but very high winds prevailed at the same time, drifting the snow badly. The Iowa division of the Milwaukee & St. Paul and the Iowa lines of the Illinois Central were the worst sufferers, being blocked at many points by drifts from 10 to 12 ft. deep, and all trains had to be abandoned. All the lines from Chicago to Omaha were more or less blocked, however. In Northern Wisconsin and Minnesota railroad travel was almost entirely stopped for several days, and large forces of men were required to clear out the drifts. Further west the storm was not so violent, and both the St. Paul and the Northwestern roads escaped on their Dakota line with comparatively slight blockades, while no serious trouble is reported on the Northern Pacific west of Minnesota.

Texas, Santa Fe & Northern.—This company has been organized, and at the first meeting of the new board it was resolved to assess all subscribers to the stock for the purpose of paying off old debt and making preparations to begin work on the road. The projected line is from Santa Fe, N. M., northward 28 miles to Española, the present terminus of the New Mexico Division of the Denver & Rio Grande. The object of the present management is to begin work early in the coming spring. The company has been organized for several years, but has never done any work beyond a little grading.

Toledo, Cincinnati & St. Louis.—The United States Circuit Court, on hearing the application of the Receiver for an order defining his duty in relation to the rolling stock leased from the various Car Trusts, has made an order authorizing him to retain 15 locomotives, 10 passenger cars, 300 box, 25 stock, 75 coal, 50 flat and 11 caboose cars, and to pay rental for the same. The Receiver was limited by a former order to the running of one mixed train daily over the road, but the Court now authorizes him to run additional trains if he thinks it necessary or profitable. The order further forbids him to allow any of the equipment to go off the line of the road, or to incur any mileage charges for the use of cars of other roads, except in case of local shipments for which full rates can be obtained.

Troy & Greenfield.—The tenth annual report of the Manager of the Troy & Greenfield Railroad and the Hoosac Tunnel states that during the year the operating companies have paid over 50 per cent. of their gross earnings from the traffic of the road, amounting to $281,414. There has been received from other sources $34,961, making a total income of $316,375. There has been expended by the Manager in the operation of the road $192,430 and in performing services for other roads, for which payment has been collected $26,595, making a total of $219.026, leaving $97,349 as net earnings for the year. The double track has been opened for use from Rockland to Conway Junction, 7.47 miles. The remaining portion, from Conway Junction to West Deerfield, is well advanced. Changes in the line have been made reducing the curvature about 60° on the heaviest grade. The whole amount appropriated for double tracking, beginning in 1879, is $991,133, and the amount expended is $955,423. The Manager has exercised personal supervision over the conduct of the road for the past year, and reports several improvements made at small cost. The whole number of persons employed Sept. 30 last was 269 in operating the road and 118 in construction. The movement of freight cars through the tunnel was as follows:

	East-bound.	West-bound.	Total.
Loaded	80.920	38,259	119,179
Empty	2,579	44,688	47.217
Total	83.499	82,897	166:96
Per cent. of loaded	96.9	46.2	71.6

The number of trains of all kinds passing through the tunnel was 11,573. The total passengers carried numbered 311,710, making a passenger-mileage of 5,666 479. The total tons of freight moved was 1,421,910, making a ton mileage of 52.939.731. The passenger gross earnings amounted to $133,237, and the freight gross earnings to $414,340. The estimate for operating expenses the coming year is $190,000.

Wisconsin Central.—A Milwaukee dispatch states that the directors of the Chicago, Milwaukee & St. Paul Co. have referred to the President and General Manager, with power, the application of the Wisconsin Central for the use of this road to Chicago. It is said that they are opposed to granting the application on the terms offered by the Wisconsin Central, especially as this road is now a competitor of the St. Paul for through Chicago and St. Paul business.

Wisconsin Railroads.—A Milwaukee dispatch says: "The biennial report of Railroad Commissioner Haughn will be issued in a few days. The Commissioner states that during the time embraced in the report the Chippewa Falls & Northern has become a part of the Omaha system, and the Wisconsin & Michigan a part of the Milwaukee & Northern, for purposes of operation. The Fond du Lac, Amboy & Peoria was absorbed by the Chicago, Milwaukee & St. Paul, and its track changed from a narrow to a standard gauge. The St. Paul Eastern Grand Trunk was rented to the Milwaukee, Lake Shore & Western, and is operated by it. The lease of the Milwaukee & Northern to the Wisconsin Central expired, and that road is now operated by the parties owning it. The cost of all the roads, including equipment, was reported in 1884 at $162 936.363.

"The Green Bay, Winona & St. Paul appears to be the most expensively built road in the State, the cost per mile having been $70,406; the Wisconsin Central cost $61,271 per mile, the Northern Pacific $55,998, the Omaha $40,584, the Milwaukee & St. Paul $31,018, and the Northwestern $44,090.

"The total stock and debt of the roads in Wisconsin on June 30, 1884, was $158,726,279 an average of $40,435 per mile, and an increase of $16,423,651 during the last two years on 492.9 additional miles. This does not include the Northern Pacific. Of the above totals $75.119.662 is stock, $83,142,217 bonded indebtedness, and $464,899 floating debt. There was paid on this investment during 1883 $3,603,390 in interest on funded debt and $1,813 128 on stock. Only three companies reported dividends declared, and one of these on preferred stock only. During 1884 the interest paid was $4,339,247—a little less than 5½ per cent. on the investment—and dividends declared, $2,245,112, not quite 3 per cent. on the total stock reported. The companies reporting dividends paid in 1884 were: Milwaukee & St. Paul, $1,192,298; in 1883, $1 026,659; Chicago & Northwestern, $710,493; in 1883, $743,049. The total income of all lines in Wisconsin in 1883, was $20,245,255, an increase over the previous year of $575,327. For 1884 the income was $21,120,871, an increase over 1883 of $875,616."